

FINAL

US EPA RECORDS CENTER REGION 5



487777

[Redacted Copy]

REMEDIAL ACTION WORK PLAN

DETREX FACILITY SOURCE CONTROL AREAS

Prepared for
Detrex Corporation
1100 North State Street
Ashtabula, Ohio

August 28, 2000

URS Greiner Woodward Clyde
A Division of URS Corporation

30775 Bainbridge Road
Suite 200
Solon, Ohio 44139
440/349-2708
Project No. 38.08E06011.00

8 Pages Redacted of Comments

TABLE OF CONTENTS

Section 1	Introduction	1-1
Section 2	Remedial Action	2-1
Section 3	Construction Quality Assurance Plan	3-1
Section 4	Operation Maintenance and Monitoring Plan	4-1
Section 5	Procedures and Plans for Decontamination of Equipment and Disposal of Contaminated Materials	5-1
Section 6	Project Schedule	6-1
Section 7	Health, Safety and Contingency Plan	7-1

TABLE OF CONTENTS

List of Acronyms

ARAR	Applicable, Relevant, and Appropriate Regulations
bgs	below ground surface
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CQAP	Construction Quality Assurance Plan
CUG	cleanup goal
CWA	Clean Water Act
DNAPL	Dense Non-Aqueous Phase Liquid
DOT	Department of Transportation
ESD	Explanation of Significant Differences
EU	Exposure Unit
FBAG	Fields Brook Action Group
HDPE	high-density polyethylene
HSO	Health and Safety Officer
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
O&M	Operations and Maintenance
ODH	Ohio Department of Health
ODNR	Ohio Department of Natural Resources
OEPA	Ohio EPA Environmental Protection Agency
OHPO	Ohio Historic Preservation Agency
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCB	polychlorinated biphenyl
PIR	Problem Identification Report
PPE	personal protective equipment
QA/QC	Quality Assurance / Quality Control
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
ROD	Record of Decision
SCOU	Source Control Operable Unit
SOW	Statement of Work
TSCA	Toxic Substances Control Act
UAO	Unilateral Administrative Order
USEPA	United States Environmental Protection Agency

Section 1

Introduction

SECTION ONE

Introduction

Detrex Corporation (Detrex) operates a facility at 1100 North State Road in Ashtabula, Ohio. On February 26, 1998, the United States Environmental Protection Agency (U.S. EPA) issued a *Unilateral Administrative Order* (UAO) and a *Scope of Work for Remedial Design and Remedial Action for the Detrex Source Area* (the UAO SOW) requiring that Detrex develop plans and specifications for remedial measures at the facility. Detrex retained URS Greiner Woodward-Clyde (URSGWC) to perform the design investigation and subsequently develop the necessary plans and specifications for the project.

Phase I RI/FS Source Control environmental assessment investigations identified an area in the northeast corner of the property where soil and groundwater have been impacted by chlorinated, volatile organic compounds (VOCs; 1,1,2,2-trichloroethane, 1,2-dichloroethene, tetrachloroethene and trichloroethene) and semi-volatile organic compounds (SVOCs; hexachlorobenzene, hexachlorobutadiene and hexachloroethane). This area was formerly occupied by a series of settling ponds that were taken out of service and backfilled with soil. Soil borings and monitoring wells in this area have also identified a dense, non-aqueous phase liquid (DNAPL) layer that contains these VOCs and SVOCs.

Technical Memorandum 3 (W-C, May 1997) included a feasibility study that identified several conceptual remedial alternatives for the Detrex site. The U.S. EPA selected Alternative No. IV in the Source Control Record of Decision (ROD) issued September 1, 1997, to address the environmental conditions identified at the facility and prevent recontamination of sediment within Fields Brook. This alternative includes the following components:

- A slurry wall vertical containment barrier downgradient of the DNAPL and dissolved phase groundwater plumes;
- A DNAPL recovery system in the vicinity of the former settling ponds;
- Erosion control and grading measures in two former pond areas;
- Removal of a pile of spent catalyst material; and,
- Engineering controls to prevent recontamination of the DS Tributary, a surface stream located north of the Detrex property.

The Remedial Design investigation was completed and the Remedial Action is scheduled to begin in August 2000. The DNAPL recovery system is not included as part of this Work Plan and will be submitted under separate cover to US EPA at a later date.

The Work Plan for the Remedial Action is presented in the following sections. The Remedial Action Work Plan and the associated submittals consist of the following:

- Construction Quality Assurance Plan
- Contingency Plan
- Operation Maintenance and Monitoring Plan
- Procedures and Plans for Decontamination of Equipment and Disposal of Contaminated Materials
- Project Schedule

SECTION ONE

Introduction

- Health and Safety Plan

Section 2

Remedial Action

SECTION TWO

Remedial Action

The Scope of Work for the remedial action consists of the following.

- **Vertical Barrier Wall** - Placement of a vertical, soil-bentonite barrier wall along the leading edge of the dissolved phase plume along the western border of Detrex property, including beneath an active rail spur and on the adjoining RMI Sodium property to the north;
- **Groundwater Collection Trench** - Installation of a groundwater collection trench along the upgradient side of the slurry wall barrier to intercept groundwater flow and route it via gravity to an existing pump station for the Detrex water treatment system;
- **Interceptor Trench beneath the DS Tributary** - Installation of a groundwater interceptor trench to prevent discharge of shallow groundwater to surface water. This trench will discharge into the groundwater collection trench described above;
- **Catalyst Pile Removal** - Excavation and removal of spent catalyst materials located along the edge of the floodplain in EU-8, north of Fields Brook; and
- **Re-Grading** - Filling, re-grading and surface restoration in portions of the site to control stormwater runoff and minimize erosion and sedimentation.

These Remedial Actions are discussed in detail in the one hundred (100) percent submittal of the *Plans & Specifications For Remedial Design/ Remedial Action*.

Section 3
Construction Quality Assurance Plan

CONSTRUCTION QUALITY ASSURANCE PLAN

DETREX FACILITY SOURCE AREA

Prepared for
Detrex Corporation
1100 North State Street
Ashtabula, Ohio

August 28, 2000

URS Greiner Woodward Clyde
A Division of URS Corporation

30775 Bainbridge Road
Suite 200
Solon, Ohio 44139
440/349-2708
Project No. 38.08E06011.00

CQAP TABLE OF CONTENTS

Section 1	Introduction	1-1
	1.1 Definitions.....	1-1
	1.2 Scope.....	1-1
Section 2	Management Organization	2-1
	2.1 Owner.....	2-1
	2.2 Project Coordinator.....	2-1
	2.3 Design Engineer.....	2-1
	2.4 Construction Quality Assurance (CQA) Consultant.....	2-1
	2.5 General Contractor (Contractor)	2-1
	2.6 CQA/CQC Testing Laboratories.....	2-1
	2.7 Surveyor.....	2-2
Section 3	Construction Quality Assurance Personnel And Duties	3-1
	3.1 Project Personnel	3-1
	3.2 Design Engineer.....	3-1
	3.3 Construction Quality Assurance Manager	3-2
	3.4 Construction Quality Assurance Technicians And Specialists.....	3-3
	3.5 CQA/CQC Testing Laboratories.....	3-3
Section 4	Site And Project Control.....	4-1
	4.1 Project Coordination Meetings	4-1
	4.1.1 Pre-Construction Meeting.....	4-1
	4.1.2 Progress Meetings.....	4-1
	4.1.3 Non-Compliance Meeting(s)	4-1
	4.2 Project Control Visits.....	4-2
	4.3 Survey Control	4-2
	4.3.1 Survey Documentation.....	4-2
Section 5	Record Documents	5-1
	5.1 Daily Record Keeping.....	5-1
	5.1.1 Daily Quality Assurance Summary Report.....	5-1
	5.1.2 Daily Inspection Checklist.....	5-1
	5.2 Problem Identification Reports	5-2
	5.3 Photographs.....	5-2
	5.4 Record (Red Line) Drawings	5-2
	5.5 Transfer Of CQA Records	5-3
Section 6	Cqc/Cqa Of Soil Materials	6-1
	6.1 Reference Standards.....	6-1
	6.2 Soil-Bentonite Vertical Barrier Wall	6-1
	6.2.1 Material Evaluation.....	6-1

CQAP TABLE OF CONTENTS

	6.2.2	Inspection Of Work.....	6-1
	6.2.3	Construction Quality Testing.....	6-2
6.3		Backfill.....	6-2
	6.3.1	Backfill Material Evaluation.....	6-3
	6.3.2	Inspection Of Work.....	6-3
	6.3.3	Construction Quality Assurance Testing	6-3
	6.3.4	Protective Cover Soil Material Evaluation	6-3
	6.3.5	Inspection Of Work.....	6-4
	6.3.6	Construction Quality Testing.....	6-4
6.4		Aggregate.....	6-4
	6.4.1	Material Evaluation.....	6-4
	6.4.2	Inspection Of Work.....	6-4
	6.4.3	Construction Quality Testing.....	6-4
Section 7		Execution Of Work.....	7-1
	7.1	Site Preparation.....	7-1
	7.2	Stormwater Management And Erosion Control	7-1
	7.3	Excavation And Cleanup Verification	7-1
	7.4	Decontamination	7-1
	7.5	Waste Management.....	7-1
	7.5.1	Waste Streams.....	7-2
	7.5.2	Transportation.....	7-3
	7.6	Site Restoration.....	7-3
	7.6.1	Topsoil	7-3
	7.6.2	Seed.....	7-3
	7.6.3	Gravel Access Roads	7-3

This Construction Quality Assurance/Construction Quality Control (CQA/CQC) Plan has been developed for the Remedial Action (RA) for the Source Control Areas of Detrex Corporation (Detrex), Ashtabula, Ohio. The purpose of this Plan is to develop systematic procedures to verify and document that design and regulatory requirements are properly implemented during the RA. This plan presents the management organization, personnel and laboratory requirements, testing protocols, and inspection procedures and documentation requirements to demonstrate that the construction activities are performed in accordance with the approved design. This plan refers extensively to the project Technical Specifications to avoid duplication.

1.1 DEFINITIONS

In the context of this document:

- Construction Quality Assurance (CQA) procedures refer to means and actions employed by the CQA Consultant, on behalf of the property Owner, to assure conformity of the RA construction activities with this CQA/CQC Plan, the Drawings, and the Technical Specifications. CQA services will be provided by a party independent from the contractor responsible for constructing the RA and any manufacturers providing units to be installed as part of the RA.
- Construction Quality Control (CQC) refers to those actions taken by Manufacturers, Fabricators, Installers, and Contractors to ensure that the materials and workmanship meet the requirements of the Drawings and Technical Specifications. In the case of soil components, CQC is combined with CQA.

1.2 SCOPE

The scope of this Plan includes detailed, specific activities to be performed by CQA and CQC personnel and organizations. This plan compiles specific QA/QC issues detailed in the project Technical Specifications for clarifications and reference. This Plan does not address design issues or installation specifications.

2.1 OWNER

As Owner, Detrex is ultimately responsible for the implementation of the RA. Detrex has retained URS Corporation to perform design and CQA activities for the approved RA and related appurtenances. Detrex has also hired a remedial contractor, Environmental Construction, Inc., to perform the construction work in accordance with the approved drawings, Technical Specifications and Contract Documents (design documents).

2.2 PROJECT COORDINATOR

The Project Coordinator representing Detrex Corporation is Mr. Charles Guy. Mr. Guy will represent Detrex Corporation in coordinating all work to be completed by the Design Engineer (DE) and General Contractor.

2.3 DESIGN ENGINEER

The Design Engineer (DE) is URS Corporation (URS). URS is responsible for the design, Drawings, and Technical specifications for the RA. David A. Shaper, P.E. and Kenneth M. Armstrong, P.E. are the main persons of contact for design related issues. David A. Shaper will serve as the DE.

2.4 CONSTRUCTION QUALITY ASSURANCE (CQA) CONSULTANT

URS will also act as CQA Consultant on behalf of the Owner. URS is responsible for observing, testing, and documenting all construction activities related to the RA and site construction work. URS is responsible for issuing a Certification Report documenting that the construction was performed in general compliance with approved design documents. The Certification Report shall be stamped by a Professional Engineer registered in the State of Ohio. Kenneth M. Armstrong will serve as the CQA Manager.

2.5 GENERAL CONTRACTOR (CONTRACTOR)

The Contractor, Environmental Construction, Inc., was selected on a bid and negotiation process, based on experience comparable to the work shown and specified in the design documents. The Contractor shall be responsible for furnishing all labor, equipment, materials, and supervision for constructing the remedial design. The Contractor will be solely responsible for all CQC activities and requirements, including CQC functions provided by subcontractors.

2.6 CQA/CQC TESTING LABORATORIES

The Owner, URS, or the Contractor will retain laboratories for soil testing, as required by project specifications. These laboratories will be independent of both the Owner and the Contractor.

2.7 SURVEYOR

The Contractor shall retain a surveyor for all layout, record and payment surveys. The Surveyor shall be licensed in the State of Ohio. The Contractor shall ultimately be responsible for the work performed by the surveyor.

CQAP SECTION THREE Construction Quality Assurance Personnel and Duties

3.1 PROJECT PERSONNEL

Personnel for the Owner (Detrex) include:

- The Project Coordinator, who will be located on site.

The duties of the Owner's representative are described in the following subsection. The Project Coordinator for the remediation of the Detrex Property is Mr. Charles Guy. All the following actions should be directed to the Project Coordinator:

- Any questions or inquires regarding design or construction of any part of the project.
- Any request for a change order or action that will affect the cost or schedule of the project.
- Any proposed field change in the drawings or execution of the project.
- Any problems encountered in the field or with any regulatory authority.

The Project Coordinator will discuss:

- Design, drawings, construction or specifications with URS design engineers and respond to those who posed the questions.
- All other inquires will be reviewed with the appropriate parties and respond with answers and problem resolutions.

Personnel for the CQA Consultant (URS) include:

- The DE, who operates from the office and visits the site periodically;
- The CQA Site Manager, who will be located on-site; and
- The CQA Technicians(s), who will also be located at the site as needed.

The duties of the CQA Personnel are described in the following subsections.

3.2 DESIGN ENGINEER

The Design Engineer (DE) will be an employee of URS. The DE will:

- Direct and supervise the activities of the CQA personnel at the project site.
- Serve as the key point of contact for the Contractor with the Owner.
- Serve as the key point of contact for the CQA Consultant with the property owner.
- Attend and lead all on-site project coordination meetings (Subsection 4.1).
- Verify and approve Contractor's schedules, pay quantities and change requests.

CQAP SECTION THREE Construction Quality Assurance Personnel and Duties

3.3 CONSTRUCTION QUALITY ASSURANCE MANAGER

URS will provide a CQA Manager who is familiar with the Drawings, Technical Specifications, and overall project requirements. The CQA Manager will:

- Perform the CQA activities at the project site.
- Attend and lead all on-site project coordination and CQA-related meetings (Subsection 4.1).
- Verify and approve Contractor's schedules, pay quantities and change requests.
- Interface with the DE on all matters pertaining to design-related issues that might arise during construction.

During the actual remedial effort, the CQA Manager will:

- Determine locations for testing and sampling;
- Prepare daily reports and logs;
- Verify that all required laboratory test samples have been collected and shipped to the testing laboratory(ies), as required;
- Review and report the results of laboratory testing;
- Designate a senior CQA Technician to act on his behalf whenever he is absent from the site while operations are ongoing;
- Prepare the final Certification Report.

CQAP SECTION THREE Construction Quality Assurance Personnel and Duties

In addition, the CQA Site Manager will be responsible for:

- Reviewing the qualifications of the Contractor's equipment operators, and ensuring that care is taken to protect other portions of the work;
- Ensuring the testing requirements contained in the Project Specifications are carried out,
- Establishing or recommending additional testing requirements beyond those contained in the Project Specifications, when necessary;
- Verifying, with CQA Technicians (Subsection 3.4), all Supplier, Manufacturer, and Installer certifications and documentation and making appropriate recommendations; and
- Reviewing the Installer's personnel qualifications for conformance with those required and/or pre-approved for work on site.

3.4 CONSTRUCTION QUALITY ASSURANCE TECHNICIANS AND SPECIALISTS

The duties of the CQA Technicians are assigned by the DE and include monitoring, logging, and/or documenting all appropriate operations. All construction quality assurance consultants and any other specialists will be brought to the site when needed, and will stay as long as his/her services are needed to complete their inspections, tests, and evaluations.

The operations to be observed by the Soils CQA Technician(s) specifically include:

- Trench excavation;
- Slurry and backfill mixing and placement;
- Soils delivery, stockpiling, and placement;
- Soils moisture content, and moisture conditioning, if required; and
- Collection of soil samples for laboratory testing.

3.5 CQA/CQC TESTING LABORATORIES

The CQA and CQC Testing Laboratories are responsible for performing all soil and permeability tests, and for formally submitting the test results to the CQA Consultant.

4.1 PROJECT COORDINATION MEETINGS

To guarantee a high degree of quality during the project, clear, open lines of communication are essential. To that end, meetings are critical. The following subsections cover the minimum anticipated meeting types planned in conjunction with the remedial design implementation.

4.1.1 Pre-Construction Meeting

A pre-Construction Meeting will be held at the site address for all portions of the construction work. This meeting will be attended by the DE, the Contractor, and representative of the DE.

The pre-construction meeting will include the following activities:

- A discussion of any appropriate modifications to the CQA Plan;
- A review of the responsibilities of each party;
- A review of lines of authority and communication;
- A review of methods for documenting and reporting of the construction activities and for distributing documents and reports;
- Establishing protocols for testing;
- Establishing protocols for handling deficiencies, repairs, and retesting; and
- Review of the time schedule for all operations.

The DE will document the meeting and minutes will be transmitted to all parties.

4.1.2 Progress Meetings

Progress meetings will be held between the DE and/or CQA Site Manager, the Contractor, and any other concerned parties. During these meetings, participants will discuss current progress, planned activities for the next week, and any new business or revisions to the work. The CQA Site Manager will log problems, decisions, or questions arising at this meeting in his daily report. Any matters requiring action which are raised at these meetings will be reported to the appropriate parties, which may include the DE, the Contractor, and/or the Owner.

4.1.3 Non-Compliance Meeting(s)

One or more special meeting will be held when and if a non-compliance with the Drawings, Technical Specifications or Contract Documents, or any deficiency is present or likely to occur. At a minimum, each such meeting will be attended by the Contractor, affected subcontractors, and the Construction Manager and/or the CQA Site Manager. If the problem requires a major design modification, a DE representative should also be present. The purpose of the meeting is to define and resolve the non-compliance item or work deficiency as follows:

- Define and discuss the non-compliance or deficiency item;

- Review alternative solutions;
- Select the best alternative based on technical and cost considerations; and,
- Implement an action plan to resolve the non-compliance or deficiency item.

A person designated at the meeting will document the meeting and minutes will be transmitted to affected parties.

4.2 PROJECT CONTROL VISITS

Periodically, the construction site will be visited by the CQA Site Manager. This visit should be coordinated with a similar visit by the DE, if appropriate.

4.3 SURVEY CONTROL

All survey, layout, and related work will be performed by or under the direction of a State of Ohio-licensed surveyor with registration current throughout the life of the project.

The Contractor will be responsible for the accuracy of his surveyor's work and will maintain all reference points and stakes throughout the life of the Construction Contract. Damaged or destroyed points, bench marks, stakes or any reference points made inaccessible by the progress of the construction will be replaced or transferred to the satisfaction of the CQA Site Manager by the Contractor at the sole expense of the Contractor. The Contractor shall transfer any of the previously described points that may be subject to damage or destruction before they are damaged or destroyed.

All new (transferred) horizontal points will be tied to existing control by a closed traverse having a minimum closure at 1:20000. New vertical control points will be set via a closed loop level run having a closure of not greater than $0.05 \times (\text{times}) m$, where m is the square root of the length of the level run in miles. All new control points will be referenced by four (4) swing ties to acceptable objects and recorded. Any alterations or revisions in the reference points will be so noted and the information submitted to the CQA Site Manager immediately. All computations necessary to establish the exact position of the work from control points will be made and preserved by the Contractor.

4.3.1 Survey Documentation

All survey notes and other records necessary to accomplish the work will be neatly made in a new, bound hardcover field notebook. Field notes collected using electronic data collection will be presented on computer disk(s) accompanied by a hard copy of the raw field data.

Survey documentation will be provided on the Project Record Drawings. See Section 5.0 of this Plan for Project Record Drawing requirements.

This section describes the documentation and record keeping that will be used during the RA construction.

5.1 DAILY RECORD KEEPING

A standard daily report will be prepared in the form of a *Quality Assurance Daily Summary Report*. These reports provide documentation of remedial activities and inspections. A daily inspection checklist will be attached to the daily summary reports. As the need arises, and when appropriate, specific problem identification reports will also be prepared to address critical issues.

Daily reports and checklists will be kept together with all meeting minutes, chains-of-custody, and any other documentation generated by the project in a three-ring binder. The notebook will be kept in the field office of the DE.

5.1.1 Daily Quality Assurance Summary Report

The *Quality Assurance Daily Summary Report* will be prepared by the CQA for each day of RA construction. This report provides the chronological framework for identifying and recording all inspections and testing. The *Quality Assurance Daily Summary Report* will include the following information:

- Date, project name, location, and report number,
- Weather conditions,
- Reports on any meetings and results,
- Locations of remedial activities underway during the time frame of the report,
- Equipment being used and personnel performing work,
- Descriptions of areas or components being inspected and documented,
- Descriptions of off-site materials received, including quality verification and documentation,
- Results of testing and monitoring performed,
- Decisions made regarding approval of work items and/or corrective actions to be taken in instances of substandard quality, and
- Signature of the CQA consultant.

5.1.2 Daily Inspection Checklist

The Contractor will use daily inspection checklists to document items that require daily inspection for a significant portion of the project. Items such as stormwater management and erosion control, excavation, backfill, decontamination, waste management, and site restoration will be included on the daily checklist.

The following information will be included on each daily checklist:

- Unique report and page numbering for cross-referencing daily reports and document control,
- Description and title of the inspection activity,
- Results of the inspection activity, and
- Signature of the contractor's representative.

The Contractor shall submit an example daily inspection checklist form to the CQA consultant for approval prior to beginning site activities.

5.2 PROBLEM IDENTIFICATION REPORTS

A "problem" is identified herein as material or workmanship that does not meet the requirements of the design drawings or technical specifications. Problem Identification Reports (PIRs) will be cross-referenced to specific daily inspection checklists and summary reports where the problem was initially identified. They shall be prepared in the form of a memorandum from the CQA consultant to the Owner, with copies to the contractor and other appropriate parties (i.e. subcontractor). PIRs shall include the following information:

- Unique identifying sheet number for cross-referencing and document control,
- Detailed description of the problem,
- Location of the problem,
- Probable cause,
- How and when the problem was identified,
- Estimate of how long the problem has existed,
- Documentation of correction,
- Suggested method to prevent a similar problem, and
- Signature of the CQA consultant.

In some cases, not all information will be available or applicable. However, when available and applicable, complete information will be provided to document problems and help to prevent future problems and occurrences.

5.3 PHOTOGRAPHS

Photographs will be taken by the CQA Technician to document conditions and will be included in the quality assurance record keeping. Detrex will approve all photos prior to their use as formal documentation.

5.4 RECORD (RED LINE) DRAWINGS

The Contractor and the Contractor's licensed surveyor will maintain record information via Record Drawings and Supplemental Record Drawings.

The Contractor shall clearly and neatly mark up in red ink, one set of the Project Drawings to show record conditions. All changes from the Project Drawings, which are made in the work, or additional work, will be accurately recorded by means of details and notes. The DE will evaluate the accuracy and completeness of the Record Drawings on at least a weekly basis.

The Contractor will provide newly developed Supplemental Record Drawings to provide record information that is too extensive to be legibly provided on the Record Drawings.

5.5 TRANSFER OF CQA RECORDS

Upon successful completion of the RA, the CQA consultant will officially transmit QA documentation to the URS Project Manager to assist in preparing the Certification Report. The QA documentation will become part of the permanent RA records.

Materials are to be placed at the locations shown on the Drawings or as otherwise specified in the design documents. Specific items regarding quality control and quality assurance are detailed on an item-by-item basis within this section. Details pertaining primarily to construction issues are provided in the project Technical Specifications and are not herein duplicated.

6.1 REFERENCE STANDARDS

Test methods for all materials will be carried out in accordance with approved methods including procedures developed by the American Society of Testing and Materials (ASTM) or the American Petroleum Institute (API). Methods and materials specifications are referenced in this CQAP and the Project Specifications. Substitution of a test method referenced in the CQAP or in the Project Specifications is subject to approval of the DE.

6.2 SOIL-BENTONITE VERTICAL BARRIER WALL

The Soil-Bentonite Vertical Barrier Wall will be a low strength mixture of soil and bentonite-water slurry. The soil used to make the backfill may be taken from the excavation soils or may be imported. The vertical barrier wall shall be founded in the naturally occurring clay till layer underlying the shallow lacustrine deposits. The vertical barrier wall is intended as a permanent groundwater cutoff and shall be watertight, as defined in the Project Specifications.

6.2.1 Material Evaluation

The bentonite is a contractor-provided material. Bentonite used in preparing the bentonite-water slurry and the soil-bentonite backfill mix shall be sodium montmorillonite bentonite, of the type and manufacture noted in the Project Specifications. Bentonite shall meet the latest version of API Standard 13A, "Specification for oil well contaminants in transit and in storage at the site". URS has specified that Wyo-Ben SW-101 be used as the clay mineral additive.

Water is an owner-provided material. Water used in preparing the bentonite-water slurry and soil-bentonite backfill shall be clean and free from deleterious amounts of soil, salts, and organic matter. The water shall be the ASHCO process water supply that is available at the Detrex facility.

Backfill materials shall be composed of slurry, sand, silt, and clay and may be obtained from the trench excavation or any other source approved by the Engineer.

6.2.2 Inspection of Work

Observation of the installation of the soil-bentonite vertical barrier wall will be performed by the CQA Technicians(s). Work activities will be observed for the following:

- Proper excavation of the vertical barrier wall trench using slurry trenching techniques;
- Stability of slurry trench,
- Proper circulation and maintenance of bentonite slurry;
- Complete mixing of soil-bentonite backfill; and

- Placement of soil-bentonite backfill in the vertical barrier wall alignment as shown on the Project Drawings.

The CQA Technician(s) will provide continuous observation and documentation of the Contractor's entire soil-bentonite vertical barrier wall installation. The CQA Technicians(s) will also document the results and test locations of all construction quality tests performed by the Contractor.

6.2.3 Construction Quality Testing

The Contractor will be responsible for quality control tests and will be required to submit a CQA Plan to the Engineer. The CQA shall include at a minimum:

- One (1) slump cone test for each 25 linear feet of backfilled trench length,
- One (1) set of soundings daily of the depth to surface of the backfill at 20 foot spacings along the trench.
- Quality control samples of the bentonite-water slurry during excavation and prior to backfill placement. Tests shall include Marsh Funnel Viscosity, mud balance density, sand content, filtrate loss, and pH, as specified by API Standard Procedure RP-13B.

The Contractor's vertical barrier wall specialist will complete the following, with concurrent verification by the Engineer:

- Logging and monitoring of materials encountered during excavation. The depth of the excavation shall be sounded prior to each verticality control check, at the clay/lacustrine interface, and at the beginning and end of each shift.
- Depth soundings every 20 feet along the trench centerline, which consist of measurement of the depth to the bottom of the excavation immediately after excavating and measurement of depth to the bottom of the excavation immediately before backfilling,
- Monitoring of slurry consumption and exceptional slurry loss,
- Trench verticality and horizontal alignment checks at 20 foot depth intervals throughout the excavation sequence and at the conclusion of trench excavation, and
- Monitoring of any verticality deviations.

The CQA Technician will collect soil-bentonite backfill samples for hydraulic conductivity testing to verify that the backfill mix meets the 10^{-7} cm/sec permeability criterion. Samples will be collected at a frequency of 1 sample per 500 cy of backfill placed. A sample of the soil-bentonite slurry mixture will be collected in a 5-gallon bucket and shipped to the URS geotechnical laboratory in Solon, Ohio or Totowa, New Jersey, for hydraulic conductivity testing. A minimum of three (3) hydraulic conductivity tests will be performed, with one sample collected prior to backfill placement.

6.3 BACKFILL

The backfill will be native on-site soil excavated as specified in the design documents or designated by the RE.

6.3.1 Backfill Material Evaluation

The backfill is comprised of on-site or imported native soils mixed with the clay mineral additive. The material was evaluated and approved prior to construction activities based on soil tests performed during the design phase of the project. The compacted clay material is required to have a maximum permeability (saturated hydraulic conductivity) of 1×10^{-7} cm/sec

6.3.2 Inspection of Work

The CQA Technician(s) will perform field observation of the construction, including the following:

- Observation of the character and condition of the placement surface;
- Observation of the effects of the compaction and of the heavy hauling equipment on the previously placed soils (pumping, cracking, etc.), and correction of any soil damage caused by the equipment;
- Retesting at the same locations after a failed test;
- Noting any changes in color or texture of soils, along with the relative moisture content; and
- Continuous observation and documentation of the contractor's slurry and backfill placement operations.

6.3.3 Construction Quality Assurance Testing

The CQA Technicians will perform in-place moisture and density testing. Compacted clay will be compacted to a minimum density of 95% of the maximum dry density established by the Standard Proctor Test. The compacted clay must be compacted with a moisture content at or above the optimum moisture content. Based on pre-construction testing, soils placed to the noted minimum density and moisture content will achieve the required permeability rates and no additional permeability testing will be performed.

6.3.4 Protective Cover Soil Material Evaluation

The Protective Cover Soil is an owner-provided material. The soil was evaluated and approved prior to construction activities based on soil tests performed during the design phase of the project. Tests performed by URS include:

Test	Minimum Quantity
Moisture Content	1 test
Soil Moisture-Density Relationship	1 test
Liquid Limit, Plastic Limit, Plasticity Index	1 test
Grain Size & Hydrometer	1 test

6.3.5 Inspection of Work

The CQA Technician(s) will perform field observations of protective cover soil and general fill placement. Inspection of the construction will include the following:

- Observation of the character and condition of the placement surface; and,
- Observation of effects of equipment on the construction surface. This includes observation of the underlying geosynthetics during Protective Cover Soil placement.

6.3.6 Construction Quality Testing

No in-place testing will be required.

6.4 AGGREGATE

Various aggregate materials are required for the project to construct access roads, stream channel riprap, pipe bedding and backfill. All aggregate materials will be provided by the Contractor.

6.4.1 Material Evaluation

All required aggregates are required to meet various State of Ohio Department of Transportation (ODOT) standard specifications. Aggregate will be evaluated based on source certifications, which document that each aggregate material meets the State requirements. In addition, each material will be sampled and tested by the Contractor's CQC laboratory for grain size analysis using test method ASTM C136. The grain size test results will be compared to the ODOT requirements for verification that the project specification is followed.

6.4.2 Inspection of Work

The CQA Technician(s) will perform field inspections. Inspection work will include observation of the work to verify that the aggregates are properly placed, that adjacent geosynthetics are not damaged, and to verify that aggregate materials are not contaminated with soil fines.

6.4.3 Construction Quality Testing

No Construction Quality testing is required. The CQA Technician(s) may opt to collect aggregate samples for conformance testing at the Owner's CQA testing laboratory.

6.5 ADDITIONAL MATERIALS

Additional materials required to complete the project in accordance with the design specifications will include filter fabric, geo-textile, groundwater collection piping and remediation trailer effluent piping materials. All materials will be provided by the Contractor.

6.5.1 Material Evaluation

All construction materials are required to conform to the manufacturers specifications for quality and the approved remedial design document specifications. Manufacturers quality assurance certificates will accompany each shipment of material to the work area and be reviewed by the QA officer to verify material conformance. The certificates of quality will also be reviewed to verify that the material conforms to the remedial design document specifications. Only those materials that meet the quality requirements for **BOTH** the manufacturer and remedial design document specifications will be approved for use on this project. Due to the small volume of materials required to complete this project, quantitative testing is not anticipated at this time.

6.5.2 Inspection of Work

The CQA Technician(s) will perform field inspections. Inspection work will include visually observing all materials brought on-site for indications of non-conformance. Non-conformances shall include, but not be limited to, tears, cracks, holes, abrasions, pinch points, or other deformities that could compromise the integrity of the system. Any material with a non-conformance will be rejected for use on this project. These materials will be replaced with acceptable construction materials.

6.5.3 Construction Quality Testing

No Construction Quality testing is required. The CQA Technician(s) may opt to collect aggregate samples for conformance testing at the Owner's CQA testing laboratory.

As the RA work progresses, CQA personnel will perform routine inspections and document ongoing work activities. The following sub-sections identify the specific items that will be monitored regularly. The types of inspections to be performed and the frequency of the inspections are detailed as well.

7.1 SITE PREPARATION

During site preparation, the CQA Technician will inspect the clearing and grubbing, stockpiling of cleared and grubbed topsoil and on-site disposal of vegetation. Site preparation shall conform to the requirements of the Technical Specifications.

7.2 STORMWATER MANAGEMENT AND EROSION CONTROL

The CQA Technician will inspect all erosion control material (silt fence, hay bales, etc.) for conformance with drawings and specifications. The contractor will install all erosion control in conformance with the Technical Specifications. Inspections of erosion controls will be performed and documented on a daily basis.

7.3 EXCAVATION AND CLEANUP VERIFICATION

Prior to excavation and trenching operations, the CQA Technician will verify that all necessary site preparatory activities have been properly performed. Items such as marked utilities and stormwater/erosion controls will be inspected daily after the original inspection. The CQA Technician will notify the contractor if any corrections are necessary.

During excavation, the CQA Technician will assure that the contractor's excavation activities follow the sequence shown on the Project Drawings. All areas will be excavated to the depths shown on the drawings. An independent surveyor may be called upon to document excavation depths and grades. The CQA Technician will document all such verification.

7.4 DECONTAMINATION

The CQA Technician will inspect the decontamination facility to ensure that it complies with the requirements of the Project Specifications. Periodic inspections will be completed to ensure that the decontamination procedures maintain its integrity.

7.5 WASTE MANAGEMENT

As part of waste management, the CQA Technician will be responsible for verifying that the contractor is:

- Classifying all waste streams,
- Ensuring that all waste streams are managed according to this CQAP and the Project Specifications,
- Ensuring that the appropriate waste containers and secondary containment are provided;

- Reviewing all required paperwork and documentation for all wastes generated during remedial activities; and
- Verifying that all waste records are maintained for the field effort.

7.5.1 Waste Streams

The following is a list of waste streams that the CQA Technician will be monitoring for proper disposal:

- Cleared and grubbed material;
- Excavated soil, sediment and catalyst pile materials;
- Excavation water, stormwater, and decontamination water; and,
- Disposable personal protective equipment.

7.5.1.1 Cleared and Grubbed Material

The CQA Technician will verify that all roots, stumps, and other subsurface materials larger than 3 inches are ground and that all cleared and grubbed material is mixed and disposed with contaminated materials.

7.5.1.2 Excavated Soil, Sediment and Catalyst Pile Materials

Prior to excavation, soil will be inspected to ensure that it contains no free liquids. Excavated materials may be stockpiled for short-term material loading activities, unless the material is designated for re-use in the vertical barrier wall. No materials designated for disposal at the SOU Landfill will be stockpiled during off-work hours. The CQA Technician will monitor the loading of materials to ensure that it is performed outside the contaminated areas. Prior to its transportation, the CQA Technician will verify that each truck is inspected by the contractor to ensure that it possesses no visible exterior contamination.

The CQA Technician will confirm that a bill of lading or waste manifest is prepared for each waste hauling vehicle for transport to the SOU Landfill and that a landfill representative signs each document to verify that the load has been received. The CQA Technician will obtain copies of all waste manifests/bills of lading for information purposes. However, record keeping will be the responsibility of the Contractor.

7.5.1.3 Excavation Water, Stormwater and Decontamination Water

The CQA Technician will verify that all excavation, stormwater and decontamination water are collected and transported or pumped directly to the Detrex Wastewater Treatment Facility for treatment. Surface water from the temporary diversion of the DS Tributary is not considered waste and will be returned to the DS Tributary.

7.5.1.4 Disposable Personal Protective Equipment

The CQA Technician will verify that disposable personal protective equipment is disposed with the materials designated for the SOU Landfill.

7.5.2 Transportation

The transport of contaminated materials on public roadways will be performed by a licensed DOT transported, using appropriate DOT licensed and approved vehicles. The CQA Technician will verify that the contractor supplies documentation of such licensing and proper training. In addition, waste hauling vehicles will be inspected to ensure proper placarding in accordance with 49 CFR 172, Subpart F, and that all vehicles are adequately protected to prevent leakage, spillage, or fugitive dust during transport.

7.6 SITE RESTORATION**7.6.1 Topsoil**

Topsoil will be inspected to ensure that it is reasonably free of roots, rocks larger than two-inches, subsoil, debris, large debris, and other foreign matter. The CQA Technician will verify that a minimum of six inches is placed in all areas requiring topsoil.

7.6.2 Seed

The CQA Technician will collect data, provided by the contractor from the seed supplier, that shows proper seed mix per the Technical Specifications.

7.6.3 Gravel Access Roads

Gravel haul roads shall be installed as though serving as a base material for paving. The CQA Technician will monitor installation of the access road using the appropriate ODOT specifications as a guide for appropriate inspections.

Section 4
Operation, Maintenance and Monitoring Plan

OPERATION MAINTENANCE AND MONITORING PLAN

DETREX FACILITY SOURCE AREA

Prepared for
Detrex Corporation
1100 North State Street
Ashtabula, Ohio

August 28, 2000

URS Greiner Woodward Clyde
A Division of URS Corporation

30775 Bainbridge Road
Suite 200
Solon, Ohio 44139
440/349-2708
Project No. 38.08E06011.00

OM/MP TABLE OF CONTENTS

Section 1	Description of Normal Operation and Maintenance.....	1-1
1.1	Vertical Barrier Wall.....	1-1
1.2	Groundwater Collection Trench.....	1-1
1.3	Interceptor Trench beneath the DS Tributary	1-1
1.4	Surface Re-Grading.....	1-2
Section 2	Description of Potential Operating Problems.....	2-1
2.1	Vertical Barrier Wall.....	2-1
2.2	Groundwater Collection Trench.....	2-1
2.3	Interceptor Trench beneath the DS Tributary	2-1
2.4	Surface Re-Grading.....	2-1
Section 3	Quality Assurance Project Plan for OM&M.....	3-1
Section 4	Description of Alternate OM&M	4-1
Section 5	Corrective Action	5-1
Section 6	Safety Plan for OM&M.....	6-1
Section 7	Description of Equipment.....	7-1
Section 8	Records and Reporting Mechanisms	8-1

The remedial actions completed for the source control areas at the Detrex Corporation facility will require minimal maintenance and monitoring. The maintenance and monitoring program to be described in this Operation, Maintenance and Monitoring Plan will be for the following:

- Vertical Barrier Wall;
- Groundwater Collection Trench;
- Interceptor Trench beneath the DS Tributary;
- Surface Re-Grading

The following sections describe the tasks for the operation and maintenance of each of the above listed actions.

1.1 VERTICAL BARRIER WALL

The vertical barrier wall is a passive remedial action that requires no operation or maintenance program. Groundwater samples and elevations will be collected from monitoring wells located upgradient and downgradient of the barrier wall. Groundwater elevations will be collected semi-annually and samples for analysis will be collected annually for the first five years of operation for VOC analysis (Method 8260). After five years of sampling, a review will be made of the results and the sampling program may be modified if results appear to be stable.

1.2 GROUNDWATER COLLECTION TRENCH

The groundwater collection trench is a passive remedial action that will require minimal maintenance. Inspection of the flow from the trench at the pump station and the associated cleanouts will be conducted on a weekly basis. The inspection will identify any damage to the cleanouts or if the flow to the pump station is consistent, indicating no trench obstruction. If standing water is noted in the cleanouts, a cleaning contractor will be retained.

The groundwater collected from the trench will be transferred to the existing wastewater treatment system. Operation and maintenance on the treatment system is described in the existing plan for the treatment system.

1.3 INTERCEPTOR TRENCH BENEATH THE DS TRIBUTARY

The interceptor trench beneath the DS Tributary is a passive remedial action that will require minimal maintenance. Inspection of the groundwater discharge from the trench at the pump station and the associated cleanouts will be conducted on a weekly basis. The inspection will identify any damage to the cleanouts or if the flow from the trench is consistent, indicating no collection trench obstruction. If standing water is noted in the cleanouts, a cleaning contractor will be retained.

The groundwater collected from the trench will be transferred to the existing wastewater treatment system. Operation and maintenance for the treatment system are described in the existing plan for the treatment system.

The wastewater is discharged after treatment to an NPDES-permitted discharge point. The existing NPDES monitoring program addresses the groundwater constituents identified at the Detrex facility.

1.4 SURFACE RE-GRADING

Several areas will be backfilled and regraded to control stormwater runoff and reduce surface erosion. Upon completion, visual inspection will be completed once per week, as well as after storm events. When the vegetative cover has progressed to the stage that erosion is minimized, the inspections will be reduced to monthly.

Potential operating problems with the remedial actions at the Detrex facility are described in the following sections.

2.1 VERTICAL BARRIER WALL

No operating problems are foreseen for the vertical barrier wall. Problems with the construction of the vertical wall barrier are addressed in the contractors contingency plan. The groundwater monitoring wells used to monitor the conditions around the barrier wall could become damaged at the surface or the screens become blocked (by silt) and unusable.

If the monitoring wells were to become unusable, repairs would be made to return the wells to service. If the wells could not be repaired, replacement could be an option.

2.2 GROUNDWATER COLLECTION TRENCH

The only problem that could affect the groundwater collection trench would be the trench collecting silts and fines and restricting the flow. The trench collection piping is equipped with cleanouts that will be used if the flow is significantly restricted.

2.3 INTERCEPTOR TRENCH BENEATH THE DS TRIBUTARY

The same problems and remedies that would affect the groundwater trench stated above could affect the interceptor trench and would be addressed accordingly.

2.4 SURFACE RE-GRADING

At completion of the surface filling and regrading, if a significant storm event occurs prior to the vegetation developing its root system, erosion may impact the surface grading. The vegetative cover is designed to develop rapidly during the growing season of Northeast Ohio. If a significant storm event is expected after the grading, preventive measures would be installed to minimize the erosion, such as silt fences or straw bales.

Routine inspections will be the only requirement for the remedial action at the Detrex facility. Groundwater elevation data will be collected from monitoring wells to verify the impact that the collection trenches and the vertical barrier wall are having on the local hydrology.

The location of the monitoring wells to be used to collect groundwater elevations will be determined after installation of the vertical barrier wall. Groundwater samples for laboratory analysis will also be collected. The samples will be analyzed for volatile organic compounds (Method 8260). The procedures and the QA/QC for the groundwater sampling are outlined in the January 8, 1999 *Remedial Design Work Plan, Appendix A, Addendum to Revision 3 - Quality Assurance Project Plan For Source Control RI/FS Phase I.*

As discussed previously, the remedial actions to be completed at the Detrex facility consist of passive controls, Therefore, alternate OM&M is not necessary.

The corrective action is associated with sampling of the monitoring wells and the NPDES discharge. If data collected from the monitoring wells indicates that the remedial actions are not performing as required, additional assessment activities will be implemented. Prior to implementing any assessment activities, a scope of work for the assessment will be submitted to US EPA for review and approval.

The addition of the groundwater collection and interceptor trench water to the wastewater treatment system does not require additional corrective action. Corrective actions currently in place for the wastewater treatment system are sufficient to prevent releases or threatened releases of hazardous substances, pollutants or contaminants that may endanger human health and the environment.

Health and Safety Plans have been prepared for numerous phases of investigations conducted at the Detrex facility. A Health, Safety and Contingency Plan has been prepared and is part of the Remedial Action Work Plan. This Health, Safety and Contingency Plan also addresses the safety concerns for the planned OM&M activities. The safety plan for the wastewater treatment system is addressed under the Detrex safety plans.

The remedial actions will rely on existing equipment to support their operation. The existing equipment consists of the pumps to transfer collected groundwater to the existing wastewater treatment system and the treatment system components. The description of this equipment is contained in other documents at the Detrex facility.

OM/MP SECTION EIGHT

Records and Reporting Mechanisms

A report will be prepared for each inspection completed for the remedial actions. These reports will be archived in the project file and stored at URSGWC office. Copies of laboratory records will be included in the required reports with the original and electronic copies stored at URSGWC.

Monthly status reports will continue to be prepared by URSGWC and submitted to USEPA.

Personnel and maintenance records, along with emergency reporting requirements, will be the responsibility of Detrex.

Section 5

Decontamination

PROCEDURES AND PLANS FOR DECONTAMINATION OF EQUIPMENT AND DISPOSAL OF CONTAMINATED MATERIALS

DETREX FACILITY SOURCE AREA

Prepared for
Detrex Corporation
1100 North State Street
Ashtabula, Ohio

August 28, 2000

URS Greiner Woodward Clyde
A Division of URS Corporation

30775 Bainbridge Road
Suite 200
Solon, Ohio 44139
440/349-2708
Project No. 38.08E06011.00

DECON TABLE OF CONTENTS

Section 1	Introduction	1-1
Section 2	Procedures and Plans	2-1
2.1	Decontamination Material Handling.....	2-1
2.2	Decontamination Pad	2-1
2.3	Waste Disposal.....	2-1
2.3.1	Soil	2-1
2.3.2	Rinseate Water	2-1
2.3.3	Miscellaneous Debris.....	2-2

Appropriate parts of the heavy equipment that are in direct contact with potentially contaminated media during the sampling and removal activities will be decontaminated prior to beginning work and prior to leaving the site. The heavy equipment decontamination procedures will consist of brushing or scraping debris from exposed equipment surfaces, as required, followed by at least three separate high pressure hot water wash/rinse cycles using a steam-cleaning unit.

Other reusable equipment (such as shovels, trench boxes, gravel boxes, pump hoses etc.) will be cleaned in the same manner as the heavy equipment.

2.1 DECONTAMINATION MATERIAL HANDLING

Rinsate water generated by decontamination procedures will be transferred to the Detrex wastewater treatment system.

Miscellaneous debris (such as disposable protective clothing and plastic sheeting) that contacts soil will be placed either into plastic-lined, 55-gal drums or into the containers specifically dedicated for this debris. Sampling and analysis of the debris will be performed as required for off-site disposal.

2.2 DECONTAMINATION PAD

All heavy equipment decontamination will be performed over a decontamination pad. The exact location of the decontamination pad will be determined in the field. Other reusable equipment (such as shovels, trench boxes, gravel boxes, pump hoses etc.) may be cleaned at the decontamination pad.

The decontamination pad to be used during the remedial action activities will be designed so that decontamination water drains directly into the Detrex waste water treatment system. A decontamination pad may be constructed if a suitable area is not identified. The constructed decontamination pad would consist of two layers of 6-mil-thick plastic sheeting, which will be laid over minimum 1/2-inch thick plywood and taped at the joints. The sides of the plastic will be raised by tacking them to common 4" by 4" lengths of wood, thereby creating a lip along the pad perimeter. Two 4-ft wide rows of minimum 1/2-inch thick plywood will be placed over the plastic sheeting to prevent tearing when heavy equipment is driven on and off of the pad. Rinsate water will be collected in a sump at the corner of the pad area. The pad will be large enough to accommodate the equipment to be decontaminated and is anticipated to be approximately 20 ft by 20 ft.

Fluids that accumulate in the sump shall be transferred to the wastewater treatment through the storm drain sewer.

2.3 WASTE DISPOSAL

All waste materials (such as soil, rinsate, and miscellaneous debris) that are generated during the remedial action activities will be managed and disposed of in accordance with the appropriate regulations. Details regarding the waste disposal are as follows.

2.3.1 SOIL

Excavated materials will be properly characterized for disposal purposes. It is anticipated that soil will be disposed at the Fields Brook SOU Landfill or be transported off-site to a permitted TSD facility by a licensed hauler.

2.3.2 RINSEATE WATER

Rinsate water will be transferred to the Detrex wastewater treatment system.

2.3.3 MISCELLANEOUS DEBRIS

It is anticipated that miscellaneous debris will be disposed of in the same manner as the excavated soil. All debris that meets the criteria set forth in the Hazardous Waste Debris Rule shall be managed and disposed in accordance with the Rule. Any wastes that do not meet the criteria of the Rule shall be managed properly, including determining if the waste meets the listed or characteristic criteria in accordance with OAC 3745-31. Thus, if the soil removed during the remedial action activities is classified as solid waste, the miscellaneous debris will also be managed as solid waste. If the soil is determined to be a hazardous waste, the debris will also be managed as a hazardous waste.

PERSONAL DECONTAMINATION

The degree of decontamination required is a function of both a particular task and the physical environment within which it takes place. The following decontamination procedure, although somewhat specific to the tasks described herein, will remain flexible, thereby allowing the decontamination crew to respond appropriately to the changing environmental conditions which may arise at the site. The procedure shall be followed by all ECI personnel who are on the site. Also see Figure 2 for Decontamination Layout.

- | | | |
|------------|---|---|
| Station 1: | Equipment Drop | 1. Deposit equipment used on-site (tools, containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop will reduce the probability of cross contamination. |
| Station 2: | Boots and Gloves Wash and Rinse | 2. Scrub outer boots and outer gloves with decon solution or detergent water. Rinse off using copious amounts of Water. |
| Station 3: | Tape, Outer Boot And Glove Removal | 3. Remove tape, outer boots and gloves. Deposit tape and gloves in container provided by construction contractor. |
| Station 4: | Canister or Mask Change | 4. If worker leaves exclusive zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, and worker returns to duty. |
| Station 5: | Outer Garment Removed | 5. Protective suit removed and deposited in separate container provided by construction contractor. |
| Station 6: | Face Piece, Hard Hat, Goggles Removal

placed | 6. Face piece or goggles removed (if used). Avoid Safety touching face with fingers. Face piece and/or goggles deposited on plastic sheet. Hard hat removed and placed on plastic sheet. |
| Station 7: | Inner Glove Removal | 7. Inner gloves are the last personal protective equipment to be removed. Avoid touching the outside of the gloves with bare fingers. Dispose of these gloves in container provided by construction contractor. |
| Station 8: | Field Wash | 8. Proceed to personnel decontamination facility provided by construction contractor. A shower will be required. |

DECONTAMINATION FOR MEDICAL EMERGENCIES

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as defined, and then administer first-aid. In the event of a major injury or other serious medical concern (i.e., heat stroke), immediate first-aid is to be administered and the victim transported to the hospital in lieu of further decontamination efforts unless exposure to a site contaminant would be considered "Immediately Dangerous to Life or Health".

DECONTAMINATION OF FIELD EQUIPMENT

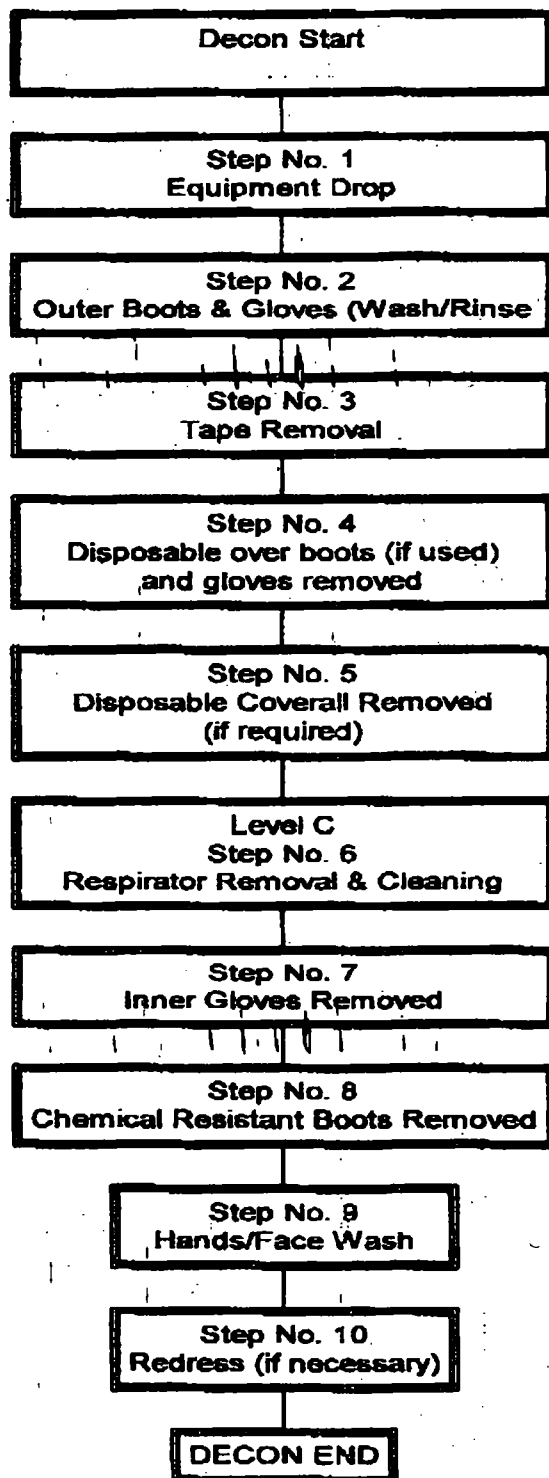
Appropriate parts of excavators and hand tools used in site activities will be fully decontaminated prior to leaving the site. A decontamination pad will be constructed adjacent to the excavation area for the decontamination of heavy equipment used to excavate the contaminated soils at the site. A pressure washer will be available to decon equipment (if necessary) which have been in contact with contaminated soils.

Pressure washers/steam cleaning units pose substantial potential for injury. Only qualified individuals familiar with the proper operating procedures will be involved with equipment decontamination activities. Field personnel will follow the safety guidelines for this task outlined in this document. The level of PPE to be used during decontamination activities will be in accordance with the contaminated material in question.

DECONTAMINATION WASTE

Liquid and solid wastes produced during decontamination will be containerized in DOT approved 55-gallon drums and staged on-site. Every attempt will be made to reduce contamination on equipment to levels as low as are reasonable achievable.

Figure 2. Decontamination Layout



Section 6
Project Schedule

PROJECT SCHEDULE

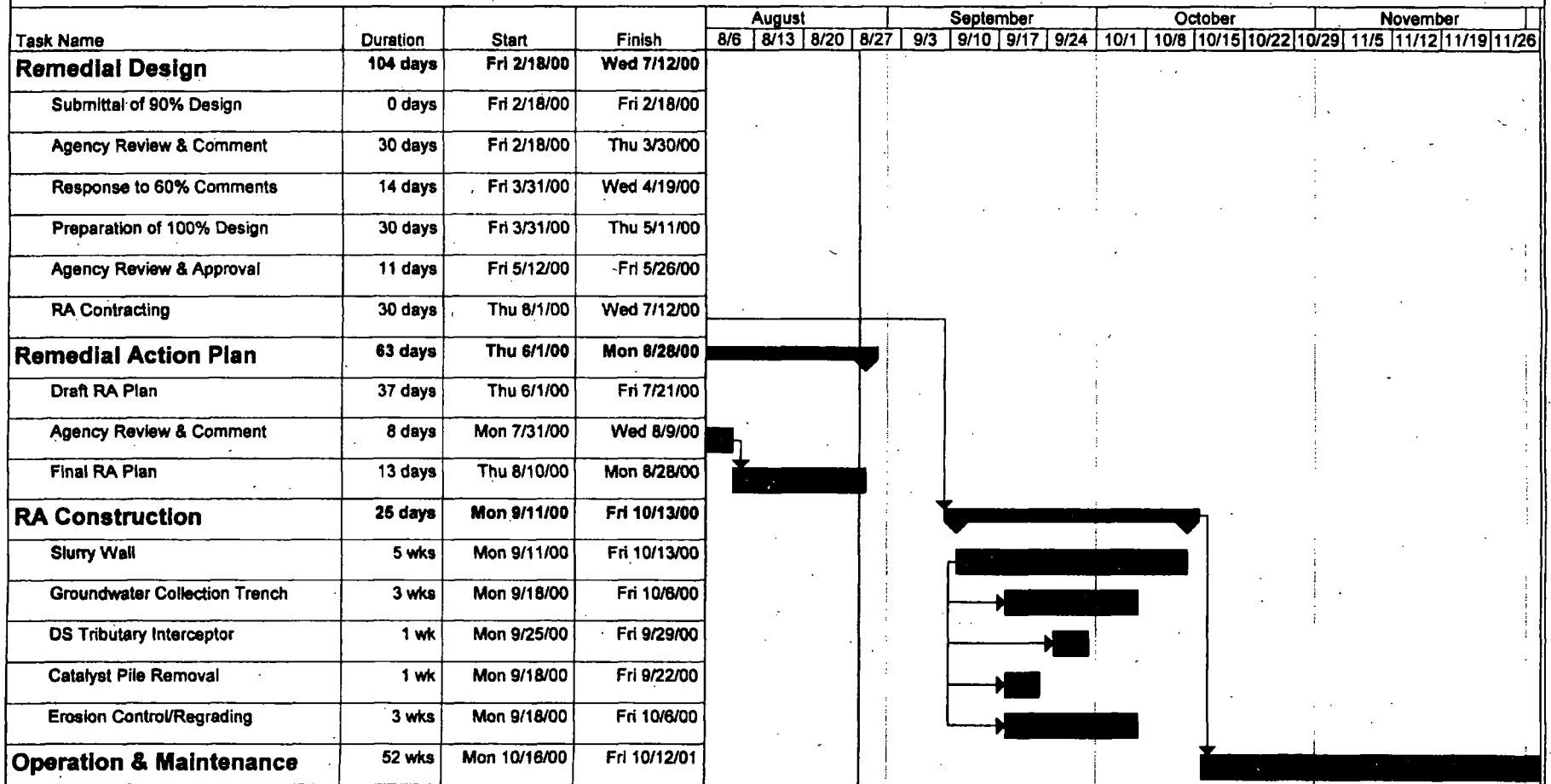
Prepared for
Detrex Corporation
1100 North State Street
Ashtabula, Ohio

August 28, 2000

URS Greiner Woodward Clyde
A Division of URS Corporation

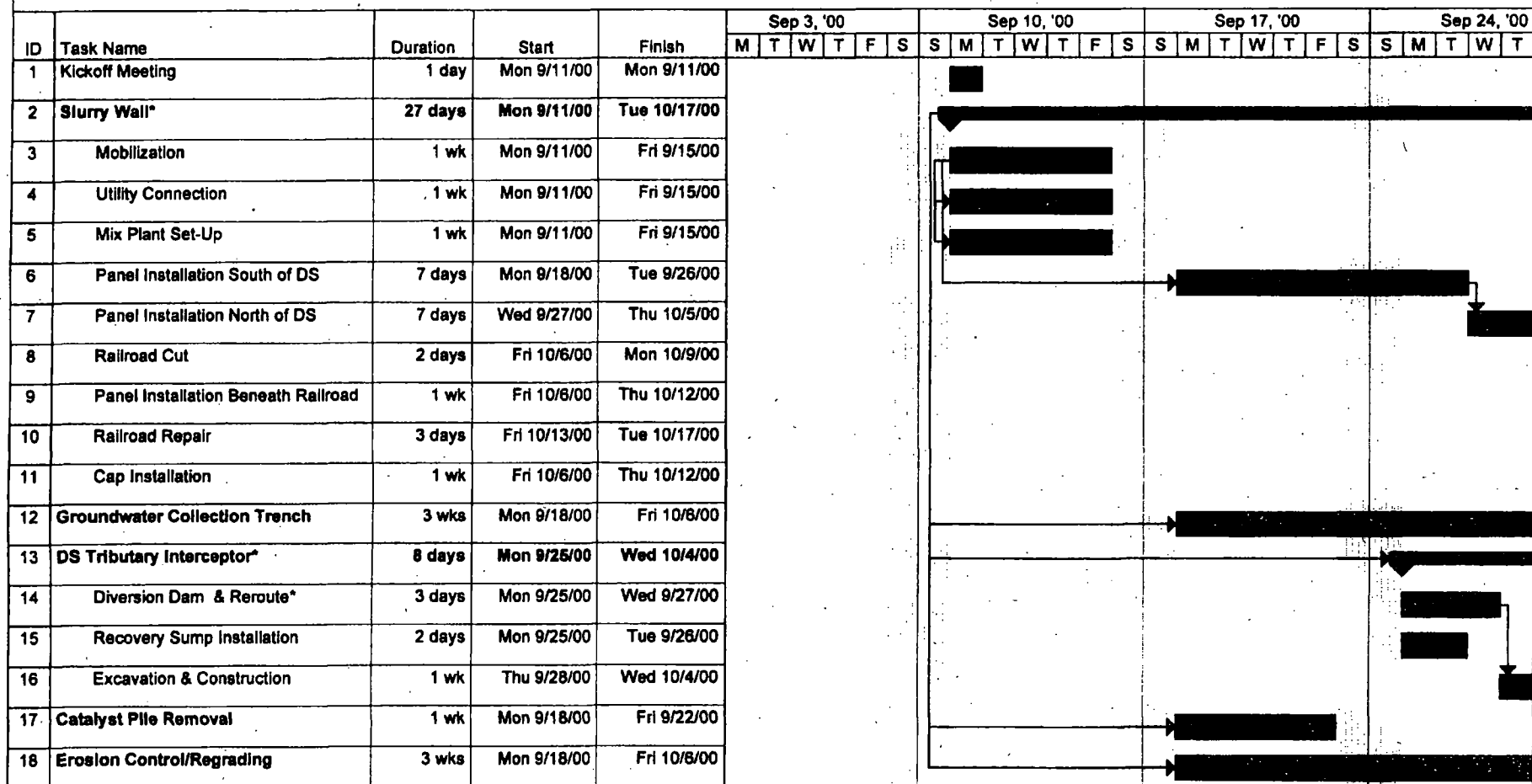
30775 Bainbridge Road
Suite 200
Solon, Ohio 44139
440/349-2708
Project No. 38.08E06011.00

Figure 1
Remedial Design/Remedial Action Construction Schedule
Detrex Corporation - Ashtabula, Ohio



Project: SCHED1 Date: Mon 8/28/00	Task		Summary		Rolled Up Progress	
	Split		Rolled Up Task		External Tasks	
	Progress		Rolled Up Split		Project Summary	
	Milestone		Rolled Up Milestone			

Figure 2
Remedial Action Construction Schedule
Detrex Corporation - Ashtabula, Ohio



* - Denotes a task critical to the Sediment Operable Unit (SOU) remedial action schedule.

Task

Split

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Split

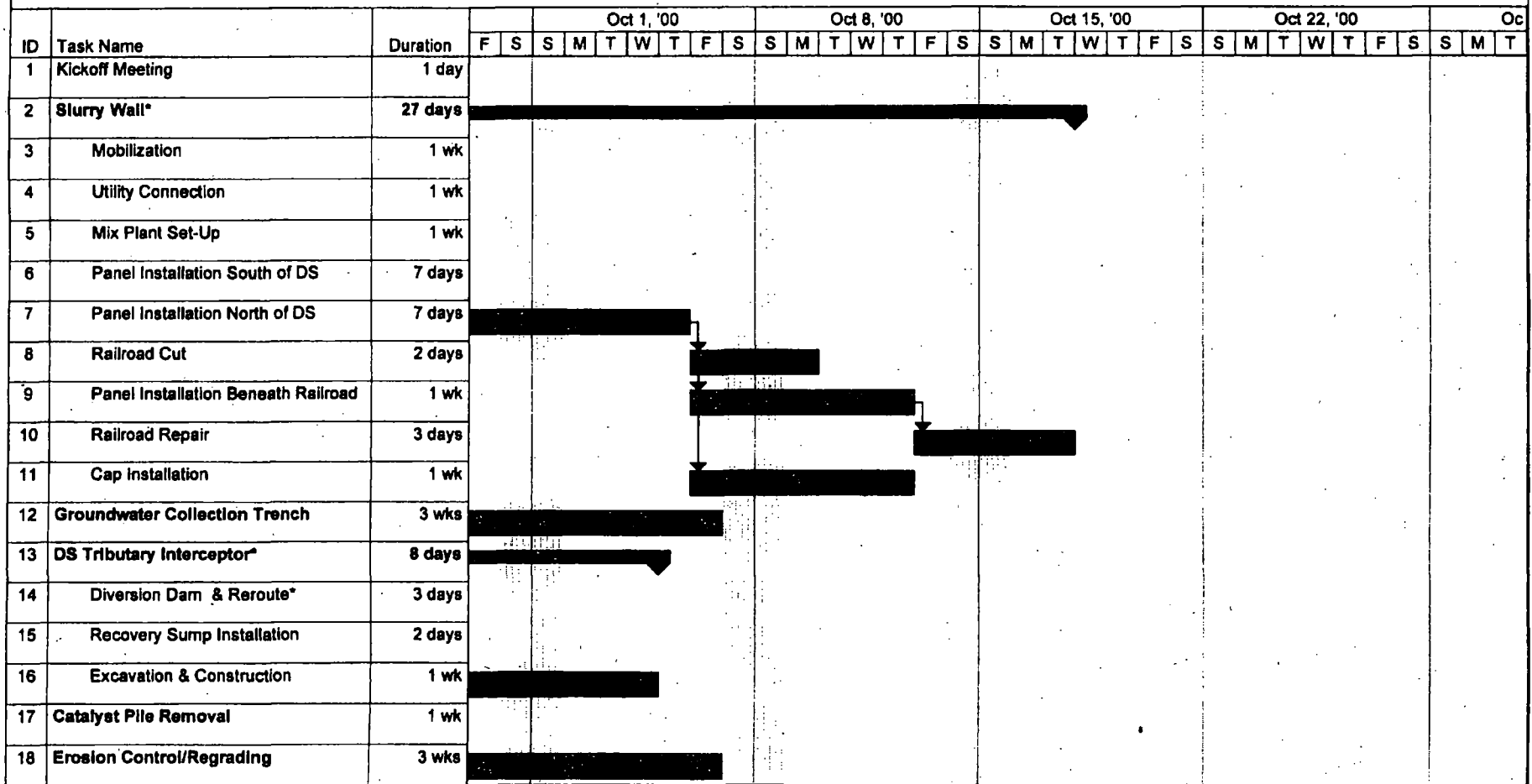
Rolled Up Milestone

Rolled Up Progress

External Tasks

Project Summary

Figure 2
Remedial Action Construction Schedule
Detrex Corporation - Ashtabula, Ohio



***** - Denotes a task critical to the Sediment Operable Unit (SOU) remedial action schedule.**

Task

Split

Progress

Milestone

Summary

Rolled Up Task

Rolled Up Split

Rolled Up Milestone

Rolled Up Progress

External Tasks.

Project Summary

Section 7
Health, Safety and Contingency Plan

HEALTH, SAFETY AND CONTINGENCY PLAN

Prepared for
Detrex Corporation
1100 North State Street
Ashtabula, Ohio

August 28, 2000

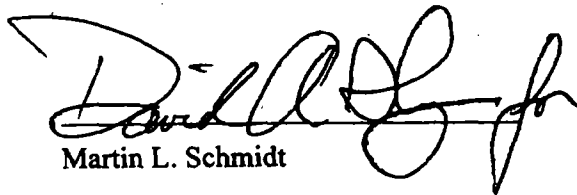
URS Greiner Woodward Clyde
A Division of URS Corporation

30775 Bainbridge Road
Suite 200
Solon, Ohio 44139
440/349-2708
Project No. 38.08E06011.00

**SITE SAFETY PLAN
SOURCE CONTROL REMEDIAL ACTION
DETREX CORPORATION
ASHTABULA, OHIO**

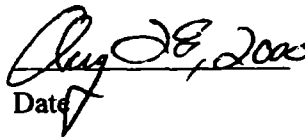
Project No. 38-08E06011

June 30, 2000



Martin L. Schmidt

Project Manager

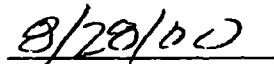


Date



Kenneth N. Armstrong

Health & Safety Manager



Date

Phillip Jones, CIH

Corporate Health & Safety Manager

Date

HSCP TABLE OF CONTENTS

Section 1	Introduction	1-1
Section 2	Subcontractor Requirements.....	2-1
Section 3	Administrative Information.....	3-1
Section 4	Site Information.....	4-1
	4.1 Background and History	4-1
	4.2 Chemicals of Concern.....	4-2
	4.2.1 Sediment	4-3
	4.2.2 Surface Water.....	4-3
	4.3 Site Maps	4-3
Section 5	Work Description	5-1
	5.1 Purpose.....	5-1
	5.2 Field Activities covered by Site Safety Plan:	5-1
	5.3 Work Zones.....	5-1
	5.3.1 Exclusion Zones.....	5-1
	5.3.2 Decontamination Stations	5-2
	5.3.3 Support Zones	5-2
Section 6	Site Hazards	6-1
	6.1 OVERVIEW OF WORK ACTIVITIES COVERED BY THIS HSCP	6-1
	6.2 General Hazard Assessment.....	6-1
	6.3 Chemical Hazards	6-2
	6.3.1 Chemical Hazards Due to Site Contaminants	6-2
	6.3.2 Exposure Routes	6-3
	6.3.3 Worst-Case Scenario Calculations.....	6-3
	6.4 Physical Hazards and Thermal Stress	6-4
	6.4.1 Drilling Hazards.....	6-4
	6.4.2 Back Safety	6-4
	6.4.3 Excavation Hazards.....	6-4
	6.4.4 Noise Exposure	6-4
	6.4.5 Slip/Trip Hazards	6-5
	6.4.6 Use of Personal Protective Equipment	6-5
	6.4.7 Heat Stress	6-5
	6.4.8 Cold Stress	6-5
	6.4.9 Electrical Hazards	6-6
	6.4.10 Flammable Hazards	6-6
	6.5 Task Hazard Analysis	6-6
	6.5.1 Mobilization and Demobilization	6-7

6.5.2	Vertical Barrier Wall Installation / Piezometer Well Installation.....	6-7
6.5.3	DS Tributary Groundwater Interceptor Trench and Effluent Sewer Installation.....	6-8
6.5.4	Groundwater Collection Trench Installation.....	6-8
6.5.5	Catalyst Pile and Stormwater Pond Sediment Removal.....	6-9
6.5.6	Re-grading, Filling and Site Restoration	6-9
6.5.7	Location and Elevation Surveys	6-10
6.5.8	Decontamination	6-10
Section 7	Activity Specific Requirements	7-1
7.1	Oversight Of Site Clearing, Excavating Activities And Surface Regrading In All Areas <u>Except The DS Tributary</u>	7-1
7.1.1	Protective Equipment (to be worn in Exclusion Zones)	7-1
7.1.2	Field Monitoring and Other Equipment.....	7-1
7.1.3	Conditions Warranting Upgrade from Level D to C.....	7-2
7.1.4	Conditions Warranting Cessation of Work and Leaving Area Immediately.....	7-2
7.1.5	Task Risk Analysis	7-2
7.1.6	Definitions.....	7-3
7.2	ACTIVITIES IN THE AREA OF THE DS TRIBUTARY	7-3
7.2.1	Personal Protective Equipment.....	7-3
7.2.2	Field Monitoring and Other Equipmen.....	7-4
7.2.3	Conditions Warranting Upgrade from Level D to C.....	7-4
7.2.4	Conditions Warranting Upgrade from Level C to BError! Bookmark not d	
7.2.5	Conditions Warranting Cessation of Work and Leaving Area Immediately.....	7-4
7.2.6	Task Risk Analysis	7-5
7.2.7	Definitions.....	7-5
7.3	Decontamination of Equipment (vehicles, sampling tools, etc.) after use in activities 1-2	7-5
7.3.1	Personal Protective Equipment.....	7-5
7.3.2	Field Monitoring and Other Equipment.....	7-6
7.3.3	Conditions Warranting Upgrade from Level D to B.....	7-6
7.3.4	Conditions Warranting Upgrade from Level C to B.....	7-7
7.3.5	Conditions Warranting Cessation of Work and Leaving Area Immediately.....	7-7
7.3.6	Task Risk Analysis	7-7
7.3.7	Definitions.....	7-7
7.3.8	Additional Evaluation Criteria.....	7-7
Section 8	Health & Safety Responsibilities	8-1
Section 9	General Work Rules	9-1

***HSCP* TABLE OF CONTENTS**

Section 10	Decontamination Procedures	10-1
10.1	Equipment.....	10-1
10.2	Personnel.....	10-1
Section 11	Emergency Procedures	11-1
11.1	Emergency Equipment.....	11-1
11.2	Evacuation Route	11-2
11.3	Hospital Route	11-2
11.4	Emergency Signal	11-2
Section 12	Documentation	12-1
Section 13	Field Personnel	13-1
Section 14	Employee Health & Safety Compliance Agreement.....	14-1
Section 15	References.....	15-1

List of Tables

Table 1	Maximum Concentrations Found of Selected Chemicals
Table 2	Selected Chemicals of Concern

List of Figures

Figure 1	Vicinity Map
Figure 2	Fields Brook Hospital Vicinity Map

List of Appendixes

Appendix A	Operating procedures - Heat Stress; Safety Procedures for Trench Construction and Other Excavating Operations
Appendix B	Hazardous Waste Incident Report Form
Appendix C	URSGWC Interim Subcontractor Policy Statement

CONTINGENCY PLAN

This Site Safety Plan (SSP) addresses field activities to be conducted at the Detrex Corp. facility during implementation of the Source Control Remedial Action. This plan outlines protocols to protect personnel against potential exposure to hazardous substances during site activities. Any deviations from this SSP will be reported immediately to the Solon Health and Safety Officer (HSO) or designated alternate.

The SSP has been developed in conformance with the directives and requirements of the Woodward-Clyde Consultants Hazardous Waste Management Practice Health and Safety Manual, 1993 through 1998 revisions. This SSP represents a revision to the former SSP prepared in January 1997 for the Remedial Investigation Study at the Detrex site. This plan supercedes the former plan and shall be used for future work at the site, pending further review at the expiration date or as the site work scope changes.

This SSP and subsequent addenda will apply to all URS Greiner Woodward Clyde (URSGWC) personnel and URSGWC subcontractor personnel who are involved with on-site activities at the Detrex Corp. facility, unless subcontractors provide their own SSP. The Detrex facility is a potentially responsible party in the Fields Brook Superfund site. A separate SSP exists for work on the Fields Brook site.

URSGWC field personnel and URSGWC subcontractor field personnel must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by Occupational Safety and Health Administration (OSHA) regulations, and must be cleared by the HSO to work on a hazardous waste site

If URSGWC subcontractors elect to follow this SSP, the requirement to comply with the plan shall be part of the contracts of those individuals and organizations doing work related to the Detrex Corp. facility. The URSGWC Interim Subcontractor Policy for hazardous waste management practice is contained in **Appendix C**.

If URSGWC subcontractors submit their own SSP, the subcontractor SSP will be reviewed by the Cleveland Health and Safety Officer (HSO). The subcontractor SSP will be accepted if its requirements are at least as stringent as those set forth in this SSP.

All URSGWC subcontractors performing intrusive work or work involving routine exposure to potentially contaminated materials at the Detrex Corp. facility must participate in medical monitoring, respirator fit testing, and hazardous waste training programs as specified by OSHA regulations. Subcontractors will provide the HSO documentation of their participation in such programs before their employees begin work at the site. Specifically, this documentation will include, for each employee 1) a brief clearance letter from a physician stating that the employee is fit to work on a hazardous waste site and to wear a respirator, 2) a statement that the employee has been fit-tested to wear a respirator, and 3) a statement that the employee has undergone the required training for work at a hazardous waste site.

URSGWC subcontractors performing non-intrusive activities such as surveying are required to follow the provisions of the HSP and SSP, but they are not required to participate in medical monitoring, respirator fit testing, or hazardous waste training programs.

All work will be conducted in compliance with applicable OSHA regulations, including 29 CFR 1910 (General Industry Standards) and 29 CFR 1926 (Construction Industry Standards). Safety precautions and programs applicable to the conduct of the work (e.g., electrical, mechanical and vehicle safety requirements), as may be regulated by federal, state and local statutes, codes, standards, rules, regulations, and orders, are the sole responsibility of the subcontractors.

HSCP SECTION THREE

Administrative Information

Site Name: Detrex Corporation
Site Location: Ashtabula, Ohio
URSGWC Project No: 38.08E06011
Operating Group: Eastern
Project Manager: Martin L. Schmidt
Health and Safety Officer: Ken Armstrong, URSGWC Cleveland, Ohio office
Dates: July 2000 through July 2001

Fields Brook (the stream itself) drains a 5.6-square-mile watershed. The eastern portion of the watershed drains Ashtabula Township and the western portion drains the eastern section of the City of Ashtabula. For the purposes of this Site Safety Plan, the Detrex site ("the Site") refers to any section of the property where work is to be performed.

The main channel of Fields Brook is approximately 3.5 miles long and begins south of U.S. Highway 20 (U.S. 20) and approximately 1 mile east of State Highway (STH) 11 (Route 11). The stream then flows northwest below U.S. 20 and Cook Road to just north of Middle Road, and then west under State Road and Route 11. From Route 11 the stream flows under Columbus Road toward the Ashtabula River, through a residential area in the City of Ashtabula. Fields Brook joins the Ashtabula River at a point approximately 8,000 ft upstream of Lake Erie.

Fields Brook has several tributaries, including the DS, Detrex and Route 11 tributaries.

Fields Brook ranges from 3 ft to 25 ft in width and is several inches to several feet deep. The Detrex tributary is approximately one foot wide and two inches deep. The DS tributary is two to four feet wide.

Average temperatures in Ashtabula range from 18 to 33°F in winter to 61 to 81°F in summer. Extreme temperatures are -17°F (winter) and 98°F (summer).

4.1 BACKGROUND AND HISTORY

Remedial investigations were conducted at the Detrex Corp. facility from June 1983 to June 1984. These investigations noted the presence of a number of priority pollutant compounds in the sediment, surface water, and fish from Fields Brook and the Ashtabula River below its confluence with Fields Brook.

In 1983, the Ohio Department of Health and OEPA issued a health advisory recommending that people not eat fish caught in a two-mile length of the Ashtabula River from the mouth of the river to the 24th Street Bridge.

Various sources have contributed organic and inorganic constituents to the sediment in Fields Brook (USEPA, 1985). Organics reported in sediment sampled during previous studies included toluenediamine, toluene diisocyanate, trichloroethane, tetrachloroethene, hexachlorobutadiene, hexachlorobenzene, polychlorinated biphenyls (PCBs), hexachloroethane, 1,2,4-trichlorobenzene, vinyl chloride, 1,1-dichloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and chlorobenzene. Metals (arsenic, zinc, mercury, chromium, lead, and titanium) at concentrations reportedly above background have also been found in the sediment by other investigators.

A 1976 study by the USEPA Environmental Research Laboratory (ERL) in Duluth reports that fish taken in and near Fields Brook show a variety of chlorinated organics. A follow-up study in 1978 substantiated the results of the 1976 study and reported the presence of PCBs and hexachlorobenzene.

The USEPA Great Lakes National Program Office funded a 1979 study to investigate sediments. Concentrations of organics, particularly hexachlorobenzene and hexachlorobutadiene, were

found to be in Fields Brook. This study also reported that Fields Brook sediment samples contained polychlorinated solvents downstream of two industrial facilities.

The 1982 USEPA Toxic Summary Report also assembled information on hazardous waste generators affecting the Ashtabula area. In accordance with RCRA, reconnaissance inspections were conducted at 10 of the area facilities. Reports following these inspections review each industry's activities and the handling of potentially toxic and hazardous materials. The results of these investigations identify a number of organic priority pollutants potentially in the effluents.

Industrial points dischargers currently have NPDES permits for conventional water quality parameters, but the permits do not generally contain provisions for non-conventional parameters such as organic priority pollutant compounds (USEPA, 1989). Potential nonpoint sources, including abandoned landfills, abandoned lagoons, and drummed or bulked material storage sites, may be discharging impurities into the stream.

Work conducted during the 1992 Source Control investigation at Detrex identified soil contamination, groundwater contamination, and the presence of dense, non-aqueous phase liquid (DNAPL). Work conducted in 1997 identified the presumed extent of the DNAPL layer and contaminated groundwater.

4.2 CHEMICALS OF CONCERN

Based on the investigations completed to date on the Detrex facility, a variety of organic compounds and metals have been identified in the soils, sediment and groundwater at the site that can potentially impact the Health and Safety of construction workers. These include chloroform, hexachlorobenzene, hexachlorobutadiene, methylene chloride, PCBs, 1,1,2,2-tetrachloroethane, tetrachloroethylene, 1,1,2-trichloroethane, trichloroethylene and vinyl chloride; Hexachlorobutadiene has a very low threshold limit value, 0.02 ppm. Inhalation of this chemical may cause coughing and difficulty in breathing, as well as eye and skin irritation.

The chemicals of concern may produce acute and/or chronic effects depending on circumstances of exposure. Inhalation of organic vapors may result in symptoms such as dizziness, nausea, fatigue, or blurred vision. Eye irritation is a common symptom of several chemicals of concern. Dermal contact with some chemicals may result in symptoms such as skin irritation, dermatitis or chloracne. Some of the chemicals of concern can be absorbed directly into the bloodstream through the skin, greatly increasing the health effects.

Exposure to chlorinated organic compounds over extended periods of time may cause liver, kidney, and lung damage. Ingestion of alcohol may increase the toxicity of these chemicals.

See Tables 2 and 3 for further information on selected chemicals of concern, including maximum concentrations found, exposure limits, and symptoms of exposure.

Detailed data sheets containing physical and toxicological properties, and health effects for the chemicals of concern will be maintained on file at the Command Post Cleveland office and will be made promptly available to field personnel upon request.

Findings from the Remedial Investigation (RI) are summarized below. It should be noted that since the Fields Brook watershed is a dynamic environment, the stated chemical concentrations in water and biota are considered to be valid only for the specific period during which RI samples were collected.

4.2.1 Sediment

The highest reported concentrations of chlorinated organic compounds, ranging up to 900 ppm, were detected in sediment from the DS tributary, the Detrex tributary, and Fields Brook between Route 11 and the Detrex tributary. More frequently detected chlorinated compounds in Fields Brook and its tributaries include chlorobenzene (up to 49 ppm); 1,2-trans-dichloroethylene (up to 42 ppm); hexachlorobenzene (up to 825 ppm); hexachlorobutadiene (up to 600 ppm); methylene chloride (up to 8 ppm); 1,1,2,2-tetrachloroethane (up to 368 ppm); tetrachloroethylene (up to 230 ppm); and trichloroethylene (up to 470 ppm).

Polychlorinated biphenyls (PCBs) were detected in Fields Brook sediment. PCB 1248 was detected up to 518 ppm in Fields Brook between Route 11 and the Detrex tributary.

Phthalate compounds were detected in sediment from Fields Brook from State Road to Route 11 at levels up to 5 ppm. Polynuclear aromatic compounds (PNAs), especially fluoranthene, phenanthrene, and pyrene, were found in sediment in the DS tributary and in Fields Brook between Route 11 and the Detrex tributary.

4.2.2 Surface Water

The DS tributary and Fields Brook below its confluence with the Detrex tributary yielded the greatest variety of organic compounds. The most frequently detected chlorinated organic compounds were 1,1,2,2-tetrachloroethane (up to 2 ppm); tetrachloroethylene (up to 0.05 ppm); and trichloroethylene (up to 1.3 ppm).

Metals in Fields Brook surface water included cadmium (up to 13 ppm), mercury (up to 0.7 ppm), and zinc (up to 160 ppm).

4.3 SITE MAPS

- General Location Map (Figure 1),
- Hospital Vicinity Map (Figure 2)

5.1 PURPOSE

To conduct remedial actions to prevent DNAPL from moving off-site, to collect existing groundwater to prevent discharge of this groundwater to surface water, removal of spent catalyst materials and regrading and filling portions of the site to control stormwater runoff and minimize erosion and sedimentation.

5.2 FIELD ACTIVITIES COVERED BY SITE SAFETY PLAN:

The following tasks include tasks performed during the 1997 investigation work. Those tasks are repeated in the event future work during the SSP validation period includes those activities.

- Ground surveying,
- Site clearing,
- Excavating for Vertical barrier wall placement (soil-bentonite slurry wall), and site restoration
- Excavating for groundwater collection trench, and site restoration
- Excavating for groundwater interceptor trench, and site restoration
- Removal of catalyst pile material, and site restoration
- Regrading and filling surface areas
- Equipment decontamination.

5.3 WORK ZONES

Work zones will be delineated by the Site Safety Officer (SSO) by means of flagging, marking tape, and/or signs.

5.3.1 Exclusion Zones

Exclusion Zones are areas where the potential exists for contact with contaminated materials or exposure to airborne hazardous constituents.

- The areas within 20 ft of excavating activities.

Personnel entering or working within the Exclusion Zones will wear personal protective equipment as described under Activity-Specific Requirements.

Personnel will proceed directly from an Exclusion Zone to a Decontamination Station before entering a Support Zone or before leaving the Site.

5.3.2 Decontamination Stations

Personnel and equipment decontamination stations will be set up as necessary near excavation locations. Location of large equipment decontamination stations will be chosen prior to the commencement of intrusive site work.

5.3.3 Support Zones

Support Zones are considered clean zones where no special protective equipment is required. Eating and drinking are allowed in Support Zones.

A Command Post will be set up in a Support Zone. Emergency equipment, such as a fully stocked First Aid kit, calibration equipment for monitoring instruments, and chemical data sheets will be stored in this area.

This section provides a general hazard assessment for hazards that may be encountered during activities and a task-by-task hazard analysis for specific tasks to be performed during the investigation.

6.1 OVERVIEW OF WORK ACTIVITIES COVERED BY THIS HSCP

The focus of this work consists of the following:

- Vertical Barrier Wall- Placement of a vertical, soil-bentonite barrier wall along the leading edge of the dissolved phase plume along the western border of Detrex property, including beneath an active rail spur and on the adjoining RMI Sodium property to the north;
- Groundwater Collection Trench – Installation of a groundwater collection trench along the upgradient side of the slurry wall barrier to intercept groundwater flow and route it via gravity to a pump station for the existing Detrex water treatment system
- Interceptor Trench beneath the DS Tributary – Installation of a groundwater interceptor trench to prevent discharge of shallow groundwater to surface water. This Trench will discharge into the groundwater collection trench described above
- Catalyst Pile Removal - Excavation and removal of spent catalyst materials located along the edge of the floodplain in EU-8, north of Fields Brook

Re-Grading - Filling, re-grading and surface restoration in portions of the site to control stormwater runoff and minimize erosion and sedimentation.

6.2 GENERAL HAZARD ASSESSMENT

A general assessment of the hazards has been made based on the scope of work described in Section 3.0. The following potential hazards have been identified:

- Inhalation of volatile contaminants;
- Skin and eye contact with contaminants;
- Ingestion of contaminants;
- Physical hazards associated with the use of heavy equipment (e.g., drilling, transport, support equipment, etc.);
- Excavation hazards;
- Noise exposure;
- Slip/trip hazards;
- Use of PPE
- Heat stress or cold stress (depending on season work is to be performed);
- Electrical hazards.
- Flammable hazards

The following sections describe the potential hazards associated with the work activities to be performed in the project area. URSGWC Standard Operating Procedures (SOPs) are referenced as appropriate and included in **Appendix A**.

6.3 CHEMICAL HAZARDS

6.3.1 Chemical Hazards Due to Site Contaminants

The chemical hazard evaluation is based on the history of the Site and the results of prior investigations at the Site. It is conducted to identify materials that may be present and to ensure that site activities, personnel protection, and emergency response are consistent with the specific contaminants expected to be encountered. The hazard analysis forms the foundation for this HASP.

URSGWC's review of the history of the Site and results of analyses performed during previous investigations indicates that workers might potentially be exposed to the following chemicals:

• Arsenic	• Toluenediamine
• Total Chromium	• Toluene diisocyanate
• Lead	• Trichloroethene
• Mercury	• Tetrachloroethene
• Zinc	• Hexachlorobutadiene
• Titanium	• Hexachloroethane
• Polychlorinated biphenyls (PCBs)	• Hexachlorobenzene
• Vinyl Chloride	• 1,2,4-Trichlorobenzene
• 1,1-Dichloroethene	• Methylene Chloride
• 1,1,1-Trichloroethane	• Chlorobezene
• 1,1,2-Trichloroethane	Poly Aromatic Hydrocarbons (PAHs)

These are considered the Chemicals of Concern (COCs) for the Site. As indicated in Section 6.0, analytical results available for the Site COCs were obtained from sediment and surface water samples, where the majority of work activities described in this HSCP will be performed.

Detailed descriptions of the, published exposure limits [including OSHA Permissible Exposure Limits (PELs), NIOSH Recommended Exposure Limits (RELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), concentrations Immediately Dangerous to Life or Health (IDLH)], routes of exposure/entry, and exposure symptoms for the contaminants of concern are included in Tables 1 and 2 of this document.

6.3.2 Exposure Routes

URSGWC personnel may be exposed to the above-listed compounds while performing the tasks described in Section 5.2 of this document and in Section 2.0 of the Remedial Action Work Plan. The primary exposure pathways of concern for these identified contaminants are as follows:

Inhalation of Volatile Contaminants

Volatile contaminants may be present in the sediments and surface water. Action levels and responses have been established for these compounds (see Section 7.0) to prevent inhalation of volatile contaminants.

Ingestion of Contaminants

Personnel may be exposed to accidental ingestion of contaminants by hand to mouth contact after contact with contaminated materials. Ingestion of contaminants will be controlled during work activities by prohibiting eating and smoking in the Contamination Reduction Zone and Exclusion Zone and by requiring all field personnel to decontaminate themselves upon leaving the Exclusion Zone. Drinking of liquids will take place only after decontamination has taken place (except in a heat stress emergency situation). PPE is considered a secondary control to avoid exposure.

Skin and Eye Contact with Contaminants

Skin and eye contact with some of the contaminants at the site may cause skin or mucous membrane irritation, eye burns, and dryness. Most of the contaminants can be absorbed into the bloodstream through the skin or eyes. Any body area that comes in contact with contaminants will be washed with soap and rinsed immediately. All field personnel will report any skin or eye contact symptoms to the URSGWC SSO. A physician will treat the person and steps will be taken to eliminate similar exposures.

6.3.3 Worst-Case Scenario Calculations

Worst-case airborne exposure scenario calculations have been performed for the volatile chemical hazards listed in this HSCP. In addition, dermal exposure calculations have been performed. The calculations were performed using the highest concentrations for groundwater detected to date on site in calculating exposure to groundwater volatilization.

The calculations indicate a potential exposure for all volatile chlorinated compounds included in the COC list. Therefore, the air quality monitoring program provided in Section 7.0 includes contingencies for evaluating air concentrations and appropriate PPE upgrade activities should contaminant concentrations exceed certain threshold concentrations.

Regarding the non-volatile contaminants, airborne concentrations are not expected to be present based on the scope of work. Dermal contact will be avoided by use of engineering and administrative controls, as well as the specified PPE.

6.4 PHYSICAL HAZARDS AND THERMAL STRESS

The following subsections discuss the physical hazards associated with the field activities presented in Section 4.0 of this HSCP along with the potential for heat and cold stress.

6.4.1 Drilling Hazards

Work activities at the site will require the use of a drill rig. All personnel in the vicinity of the operating rig will follow the safety guidelines outlined in SOP HS-203, *Safety Guidelines for Drilling Into Soil and Rocks*.

6.4.2 Back Safety

Using the proper techniques to lift and move heavy pieces of equipment is important to reduce the potential for back injury. The following precautions should be implemented when lifting or moving heavy objects:

- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting.
- Bring load as close to you as possible before lifting.
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip, and fall hazards.
- Use mechanical devices to move objects that are too heavy to be moved manually.
- If mechanical devices are not available, ask another person to assist you.

Back stress can be reduced if work is performed at waist height. When opening split spoons and collecting samples, work at a surface (waist height) rather than from the ground.

6.4.3 Excavation Hazards

Physical hazards can arise from excavation activities, which will be performed for installation of the slurry wall, removal of the catalyst pile materials, and removal of the sediments located in the DS Tributary. The possibility of cave-ins of excavations must be considered. Chemical exposures that exceed ambient levels may be encountered if personnel are required to enter excavated areas as contaminants that are heavier than air may settle if proper ventilation is not provided. All OSHA regulations for excavation (including OSHA Regulations 29 CFR 1926 Subpart P) are to be followed throughout this project.

6.4.4 Noise Exposure

Work activities will be conducted at locations with high noise levels from the operation of heavy equipment. In accordance with OSHA Regulations 29 CFR 1910.95, hearing protection will be used when noise levels exceed 85 dBA averaged over an 8-hour day. The OSHA regulation has tables and calculation formulas for figuring the allowed noise exposure without hearing

protection. In the absence of instrumentation, an appropriate rule of thumb is that when normal conversation is difficult to hear at a distance of 2 to 3 ft, hearing protection is required. URSGWC and subcontractors shall have hearing protection at the site for use by their employees during the operation of heavy equipment (i.e., backhoes and loaders) or as requested by personnel.

6.4.5 Slip/Trip Hazards

The presence of surface debris, uneven surfaces, and piles of soil contribute to tripping hazards. Surface water, groundwater brought to the surface, or precipitation at the Site, can also create a slip hazard. Care should be taken whenever walking, especially whenever equipment must be carried.

6.4.6 Use of Personal Protective Equipment

The PPE that may be required for some activities (e.g., polycoated Tyvek® coveralls, respirators, etc.) places a physical strain on the wearer. When PPE such as respirators, gloves, and protective clothing are worn, visibility, hearing, and manual dexterity are impaired. Refer to SOP HS-304, *Selection and Use of Personal Protection Equipment*.

6.4.7 Heat Stress

Heat stress is the combination of environmental and physical work factors that constitute the total heat load imposed on the body. The environmental factors of heat stress are air temperature, radiant heat exchange, air movement, and water vapor pressure. Physical work contributes to the total heat stress of the job by producing metabolic heat in the body in proportion to the intensity of the work. The amount and type of clothing also affects heat stress. Heat stress can result in a series of physiological responses. The heat stress SOP HS-201, *Heat Stress*, will be implemented to deal with this hazard.

6.4.8 Cold Stress

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body that have high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible. The most severe form of cold stress is hypothermia. Hypothermia results when the body loses heat faster than it can be produced. Hypothermia is characterized by involuntary shivers followed by speech difficulty, confusion, loss of manual dexterity, collapse, and finally death. The greatest risk of hypothermia occurs in wet conditions occurring in temperatures lower than 40°F. For a properly clothed person, the risk of hypothermia is greatly increased below temperatures of 10°F. The cold stress SOP HS-202, *Cold Stress*, will be implemented to deal with this hazard.

6.4.9 Electrical Hazards

Electrical hazards may exist at the Site and general precautions must be taken to prevent accidental contact with energized sources.

- Overhead lines must be identified and equipment must be kept at least 10 feet from energized lines or any other distance required by local ordinances, whichever is greater. It is important to note that power lines and hoist lines can be moved significantly by wind.
- Drill rigs shall never be moved with the mast erect.
- Underground utilities must be located before drilling or excavating begins. Appropriate utility companies must be contacted before intrusive work begins in accordance with local or state requirements for utility company notification.
- For drilling and excavation at industrial or other locations where underground utilities are owned by the client, as-built drawings of utility locations should be obtained if possible.
- As a general precaution, URSGWC employees shall avoid contact with operating drill rigs or backhoes to reduce the risk of electrical shock should the equipment contact a power line.
- At the first sight of lightning, operations should be stopped and only resumed when conditions permit. Daily weather forecasts should be noted for predictions of electrical storms that may affect field operations.

6.4.10 Flammable Hazards

A few of the volatile chemicals expected to be present in soil and groundwater at the site, or the vapors coming off the chemicals, are flammable or combustible. Although the flammability concerns are minor, the following safety precaution will be followed:

- In the areas of remedial action, all non-essential engines shall be turned off. All gas or diesel powered equipment used during the remedial action activities (e.g., trenching equipment and back-hoes) must be equipped with spark arrestors on the exhaust.
- Smoking will be strictly forbidden in the work areas. No lighters or matches will be permitted in the investigation areas. Smoking elsewhere on the Property will be accordance with Detrex policy.
- A Type A-B-C fire extinguisher will be present in each work area.

6.5 TASK HAZARD ANALYSIS

A task-by-task hazard analysis is presented in the following subsections. The hazard evaluation for each activity is based on the following criteria:

- Low - activities are likely to result in no exposure to hazards.
- Moderate - activities are likely to result in hazard exposure below established exposure limits.

- High - activities are likely to result in hazard exposures near or above established exposure limits.

6.5.1 Mobilization and Demobilization

<u>POTENTIAL HAZARD</u>	<u>ANTICIPATED RISK</u>
Inhalation Volatile Contaminants	low
Ingestion of Contaminants	low
Skin and Eye Contact with Contaminants	low
Working with/near Heavy Equipment	moderate
Excavation Hazards	low
Noise Exposure	low
Slip/Trip Hazards	low
Use of PPE	low
Heat Stress/Cold Stress	dependent on ambient temperature
Flammable Hazards	low
Electrical Hazards	low

6.5.2 Vertical Barrier Wall Installation / Piezometer Well Installation

<u>POTENTIAL HAZARD</u>	<u>ANTICIPATED RISK</u>
Inhalation Volatile Contaminants	moderate (in tributary) otherwise low
Ingestion of Contaminants	moderate (in tributary) otherwise low
Skin and Eye Contact with Contaminants	moderate (in tributary) otherwise low
Working with/near Heavy Equipment	moderate
Excavation Hazards	high
Noise Exposure	moderate
Slip/Trip Hazards	moderate
Use of PPE	moderate
Heat Stress/Cold Stress	dependent on ambient temperature
Flammable Hazards	moderate
Electrical Hazards	moderate

6.5.3 DS Tributary Groundwater Interceptor Trench and Effluent Sewer Installation**POTENTIAL HAZARD****ANTICIPATED RISK**

Inhalation Volatile Contaminants	high
Ingestion of Contaminants	high
Skin and Eye Contact with Contaminants	high
Working with/near Heavy Equipment	high
Excavation Hazards	high
Noise Exposure	moderate
Slip/Trip Hazards	high
Use of PPE	high
Heat Stress/Cold Stress	high
Flammable Hazards	moderate
Electrical Hazards	low

6.5.4 Groundwater Collection Trench Installation**POTENTIAL HAZARD****ANTICIPATED RISK**

Inhalation Volatile Contaminants	moderate (in tributary) otherwise low
Ingestion of Contaminants	moderate (in tributary) otherwise low
Skin and Eye Contact with Contaminants	moderate (in tributary) otherwise low
Working with/near Heavy Equipment	moderate
Excavation Hazards	high
Noise Exposure	moderate
Slip/Trip Hazards	moderate
Use of PPE	moderate
Heat Stress/Cold Stress	dependent on ambient temperature
Flammable Hazards	moderate
Electrical Hazards	moderate

6.5.5 Catalyst Pile and Stormwater Pond Sediment Removal

<u>POTENTIAL HAZARD</u>	<u>ANTICIPATED RISK</u>
Inhalation Volatile Contaminants	low
Ingestion of Contaminants	low
Skin and Eye Contact with Contaminants	low
Working with/near Heavy Equipment	low
Excavation Hazards	low
Noise Exposure	low
Slip/Trip Hazards	low
Use of PPE	low
Heat Stress/Cold Stress	dependent on ambient temperature
Flammable Hazards	low
Electrical Hazards	low

6.5.6 Re-grading, Filling and Site Restoration

<u>POTENTIAL HAZARD</u>	<u>ANTICIPATED RISK</u>
Inhalation Volatile Contaminants	low
Ingestion of Contaminants	low
Skin and Eye Contact with Contaminants	low
Working with/near Heavy Equipment	low
Excavation Hazards	low
Noise Exposure	low
Slip/Trip Hazards	low
Use of PPE	low
Heat Stress/Cold Stress	dependent on ambient temperature
Flammable Hazards	low
Electrical Hazards	low

6.5.7 Location and Elevation Surveys**POTENTIAL HAZARD****ANTICIPATED RISK**

Inhalation Volatile Contaminants	low
Ingestion of Contaminants	low
Skin and Eye Contact with Contaminants	low
Working with/near Heavy Equipment	low
Excavation Hazards	low
Noise Exposure	low
Slip/Trip Hazards	low
Use of PPE	low
Heat Stress/Cold Stress	dependent on ambient temperature
Flammable Hazards	low
Electrical Hazards	low

6.5.8 Decontamination**POTENTIAL HAZARD****ANTICIPATED RISK**

Inhalation Volatile Contaminants	low
Ingestion of Contaminants	moderate
Skin and Eye Contact with Contaminants	moderate
Working with/near Heavy Equipment	low
Excavation Hazards	low
Noise Exposure	low
Slip/Trip Hazards	moderate
Use of PPE	moderate
Heat Stress/Cold Stress	dependent on ambient temperature
Flammable Hazards	low
Electrical Hazards	low

7.1 OVERSIGHT OF SITE CLEARING, EXCAVATING ACTIVITIES AND SURFACE REGRADING IN ALL AREAS EXCEPT THE DS TRIBUTARY**7.1.1 Protective Equipment (to be worn in Exclusion Zones)*****Level D Protective Uniform***

- Hard hat,
- Face shield (if splash potential exists),
- Woven Tyvek/Work Coverall or Saran-coated Tyvek suit (if conditions are muddy and/or if splash potential exists),
- Overboots (optional),
- Outer butyl or nitrile rubber gloves (taped at wrists), if handling soils,
- Inner (surgical) gloves, if handling soils and
- Hearing protection (near active equipment).

Note: Replace Tyvek suit when ripped.

Level C Protective Uniform

- Hard hat,
- Full-face respirator with organic vapor/dust/radionuclide cartridges (replace daily or upon breakthrough),
- Saran-coated Tyvek suit (replace when ripped),
- Steel-toed and shanked neoprene boots,
- Overboots,
- Outer butyl or nitrile rubber gloves,
- Inner (surgical) gloves, and
- Hearing protection.

*Note: Tape Tyvek suit under boots and to gloves.

7.1.2 Field Monitoring and Other Equipment

- HNu with 11.7 eV probe and/or Organic Vapor Analyzer (Foxboro 128 or equivalent)

- Combustible gas/O₂ meter,
- First Aid Kit (large),
- Eye, hand and body wash,
- Fire extinguisher,
- Outdoor thermometer, and
- Walkie-talkies, or other two way communication device

7.1.3 Conditions Warranting Upgrade from Level D to C

Notify Health and Safety Officer

- HNU/OVA readings in breathing zone exceed background levels up to 2 ppm for 5 minutes,
- Visible dust is present at or near excavation, or
- Unusual odors are noted

7.1.4 Conditions Warranting Cessation of Work and Leaving Area Immediately

Notify Health and Safety Officer:

- Fire or explosion at excavating location,
- HNU/OVA readings in breathing zone exceed 5 ppm for 15 minutes, or reach a ceiling limit of 10 ppm, or alarm sounds (alarm set at 10 ppm),
- Combustible gas/O₂ meter readings at 20% LEL or greater (or alarm sounds),
- One of the above meters malfunctions (work may resume when meter is repaired)
- Odors are experienced while wearing respirators,
- Any member of field team experiences discomfort or symptoms possibly related to chemical exposure, such as dizziness, nausea, or skin or eye irritations (see Tables 2 and 3),
- Any member of field team experiences discomfort or symptoms possibly related to heat stress (such as dizziness, muscle pain or red skin) or cold stress (such as excessive shivering, loss of coordination or waxy firm skin). Institute (or continue) heat/cold stress prevention measures (see Appendix A)

7.1.5 Task Risk Analysis

The chemical hazards associated with overseeing site clearing, excavation activities and site regrading can be located in the attached Tables 1, 2 and 3. These hazards will be protected

against with upgrades to Level C dependent upon ambient monitoring levels. Cessation of work is an option if monitoring levels become too high or are impaired by working conditions.

7.1.6 Definitions

Breathing Zone

Refers to any area where field personnel may be breathing during a given activity either while standing, bending, or in any other position.

Background

Refers to an area upwind of a given activity, which is considered unaffected by site conditions.

7.2 ACTIVITIES IN THE AREA OF THE DS TRIBUTARY

7.2.1 Personal Protective Equipment

Level B Protective Uniform

- Hard hat,
- Supplied air respirator,
- Saran-coated Tyvek suit (replace when ripped),
- Steel-toed and shanked neoprene boots,
- Overboots,
- Outer butyl or nitrile rubber gloves,
- Inner (surgical) gloves, and
- Hearing protection.

***Note:** Tape Tyvek suit under boots and to gloves; replace Tyvek when ripped.

Level C Protective Uniform

- Hard hat,
- Full-face respirator with organic vapor/dust/cartridges (replace daily or upon breakthrough),
- Saran-coated Tyvek suit (replace when ripped),
- Steel-toed and shanked neoprene boots,
- Overboots,

- Outer butyl or nitrile rubber gloves,
- Inner (surgical) gloves, and
- Hearing protection.

***Note:** Tape Tyvek suit under boots and to gloves; replace Tyvek when ripped.

Level D Protective Uniform

- Saran-coated Tyvek suit or work coverall,
- Workboots,
- Overboots (if muddy conditions exist),
- Work gloves or outer butyl or nitrile rubber gloves, and
- Inner (surgical) gloves are required if brief contact with possibly contaminated water or other materials is anticipated.

***Note:** Tape overboots and gloves to Tyvek, replace Tyvek when ripped.

7.2.2 Field Monitoring and Other Equipmen

- HNu with 11.7 eV probe and/or Organic Vapor Analyzer (Foxboro 128 or equivalent),
- First Aid Kit,
- Outdoor thermometer,
- Walkie-talkies, or other two way communication device
- Eyewash.

7.2.3 Conditions Warranting Upgrade from Level D to B**Notify Health and Safety Officer:**

- HNu/OVA readings in breathing zone exceed background levels up to 2 ppm for 5 minutes,
- Visible dust is present at or near excavations, or
- Unusual odors are noted

7.2.4 Conditions Warranting Cessation of Work and Leaving Area Immediately**Notify Health and Safety Coordinator/Officer:**

- Unusual odors and/or unnatural materials are noted,

- Any member of field team experiences discomfort or symptoms possibly related to chemical exposure, such as dizziness, nausea, or skin or eye irritations (see Table 1), or
- Any member of field team experiences discomfort or symptoms possibly related to heat stress (such as dizziness, muscle pain or red skin) or cold stress (such as excessive shivering, loss of coordination or waxy firm skin). Institute (or continue) heat/cold stress prevention measures (see Appendix A).

7.2.5 Task Risk Analysis

The chemical hazards associated with activities in the area of the DS tributary can be located in the attached Tables 1 and 2. Cessation of work is an option if monitoring levels become too high or their recording becomes impossible.

7.2.6 Definitions

Breathing Zone

Refers to any area where field personnel may be breathing during a given activity either while standing, bending (over a drill rig, for example), or in any other position.

Background

Refers to an area upwind of a given activity, which is considered unaffected by site conditions.

7.3 DECONTAMINATION OF EQUIPMENT (VEHICLES, SAMPLING TOOLS, ETC.) AFTER USE IN ACTIVITIES 1-2

(Decontamination is considered a separate activity requiring air monitoring and protective gear because of the high potential for worker exposure to chemicals during decontamination.)

7.3.1 Personal Protective Equipment

Level D Protective Uniform

- Hard hat,
- Faceshield,
- Overboots,
- Poly-coated or Saran-coated Tyvek suit (replace when ripped)
- Steel-toed and shanked neoprene boots,
- Outer butyl or nitrile rubber gloves, and
- Inner (surgical) gloves.

*Note: Boots and gloves taped to Tyvek.

Level C Protective Uniform

- Hard hat
- Full-face respirator with organic vapor/dust/cartridges (replace daily or upon breakthrough),
- Poly-coated or Saran-coated Tyvek suit (replace when ripped),
- Steel-toed and shanked neoprene boots,
- Outer butyl or nitrile rubber gloves, and
- Inner (surgical) gloves.

*Note: Outer boots and gloves taped to Tyvek.

Level B Protective Uniform

- Hard hat
- Air supplied respirator,
- Poly-coated or Saran-coated Tyvek suit (replace when ripped),
- Steel-toed and shanked neoprene boots,
- Outer butyl or nitrile rubber gloves, and
- Inner (surgical) gloves.

*Note: Outer boots and gloves taped to Tyvek

7.3.2 Field Monitoring and Other Equipment

- HNu with 11.7 eV probe and/or OVA,
- First Aid Kit,
- Eyewash, and
- Fire Extinguisher.

7.3.3 Conditions Warranting Upgrade from Level D to B**Notify Health and Safety Officer:**

- HNu/OVA readings in breathing zone exceed background levels up to 2 ppm for 5 minutes,
or
- Unusual odors are noted.

7.3.4 Conditions Warranting Upgrade from Level C to B***Notify Health and Safety Officer:***

- HNu/OVA readings in breathing zone exceed 5 ppm for 15 minutes, or reach a ceiling limit of 10 ppm, or alarm sounds (alarm set at 10 ppm), or
- Unusual odors are noted.

7.3.5 Conditions Warranting Cessation of Work and Leaving Area Immediately***Notify Health and Safety Officer:***

- Unusual odors and/or unnatural materials are noted,
- Any member of field team experiences discomfort or symptoms possibly related to chemical exposure, such as dizziness, nausea, or skin or eye irritations (see Table 1), or
- Any member of field team experiences discomfort or symptoms possibly related to heat stress (such as dizziness, muscle pain or red skin) or cold stress (such as excessive shivering, loss of coordination or waxy firm skin). Institute (or continue) heat/cold stress prevention measures (see Appendix A).

7.3.6 Task Risk Analysis

The chemical hazards associated with decontamination of vehicles can be located in the attached Tables 1 and 2. These hazards will be protected against with upgrades to Level B if ambient monitoring levels so warrant. Cessation of work is an option if monitoring levels become too high or their recording becomes impaired by working conditions.

7.3.7 Definitions***Breathing Zone***

Refers to any area where field personnel may be breathing during a given activity either while standing, bending (over a drill rig, for example), or in any other position.

Background

Refers to an area upwind of a given activity, which is considered unaffected by site conditions.

7.3.8 Additional Evaluation Criteria

An alternative to relying on the upgrade and cessation action levels discussed earlier in this section would be the additional formulation of a personal air monitoring program and collection of concentration-specific air samples using colorimetric tubes.

HSCP SECTION SEVEN

Activity Specific Requirements

Any such program must be approved by the local and Corporate Health & Safety Manager.

The Site Safety Officer (SSO) is responsible for project safety, decontamination, environmental monitoring and field medical monitoring activities. The SSO will assure that all field personnel comply with the provisions of this Site Safety Plan (SSP). The SSO has the authority to stop site work in the event of a safety violation or if he/she makes the judgment that an upgraded level of personal protection may be required, and he/she may stop an operation that threatens the health and safety of personnel. The SSO is responsible for designating and marking work zones and for restricting access to Exclusion Zones and Decontamination Stations to properly attired personnel.

The SSO reports directly to the Health and Safety Officer (HSO) and should refer all safety-related questions to the HSO. The SSO will keep the HSO, the Field Manager, and the Project Manager informed of the status of safety-related site activities and assessments. The SSO will communicate with the HSO via telephone at least once a week. The SSO will notify the HSO, Field Manager, and Project Manager immediately of any personnel exposure incidents, accidents or emergency situations; any upgrade in level of protection; and any decision to stop work.

All URSGWC and URSGWC subcontractor personnel scheduled for field work at the Detrex Corp. facility will receive an initial briefing by the SSO and/or HSO prior to starting work activities. The briefing will include an explanation of the environmental hazards that could be encountered during planned activities, and work practices, procedures, and equipment for recognizing and avoiding potential hazards. The SSO will obtain written acknowledgement from each individual stating that he/she has attended this briefing and agrees to abide by the provisions of the SSP prior to allowing him/her to work on-site. The SSO or HSO will conduct health and safety meetings prior to initiation of new phases of work. Daily briefings will be conducted by the SSO on-site to reinforce health and safety awareness and to allow personnel the opportunity for comments or questions. The SSO will permanently post a copy of this Site Safety Plan in the trailer.

The SSO will confirm with the HSO the certification of URSGWC personnel and subcontractors assigned to the site. URSGWC subcontractors will provide the SSO with a written clearance for each individual prior to their being allowed to work on-site. This clearance will include notice of training and medical certification. Items required for certification of subcontractor personnel are described in the URSGWC Interim Subcontractor Policy contained in **Appendix C**.

Respirator fit testing will be conducted by the SSO for all personnel who will be working in Exclusion zones who have not been pre-qualified. URSGWC subcontractors will provide the SSO with a written confirmation of successful fit with the particular type of respirator that will be used on-site in order to be considered pre-qualified.

Field work will be conducted only during daylight hours unless adequate lighting is provided.

The buddy system, wherein personnel will maintain contact, will be observed in Exclusion Zones.

No eating, drinking, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material will be allowed in Exclusion Zones or Decontamination Stations. Smoking materials and any other ignition sources such as sparking equipment will not be allowed in Exclusion Zones and Decontamination Stations.

Contact lenses shall not be worn in Exclusion Zones or Decontamination Stations.

No jewelry which interferes with protective clothing fit will be worn.

No beards, sideburns or mustaches will be allowed which interfere with respirator mask seals if respirators are used. The SSO will determine if facial hair presents such an interference.

When respirators are worn, personnel will check the mask seal by positive and negative pressure tests daily. Respirator cartridges will be replaced immediately upon olfactory indication of breakthrough of airborne chemicals, or daily at a minimum.

Respirator fit testing will be performed with a chemical appropriate for the cartridge being used (e.g., banana oil, ammonia, or irritant smoke).

Field personnel should remain aware of wind direction through the day. Flagging or wind socks will be used for this purpose. Equipment set-up and sampling efforts should be directed to the greatest extent possible so that workers will remain upwind of potential sources of exposure.

Machinery, tools, material, electrical installation, and other equipment and work practices that are judged unsafe, or not in compliance with OSHA or other applicable standards, shall be removed or replaced or the work practice corrected. Equipment and machinery will only be operated by employees qualified by training and/or experience.

No drilling activities will be permitted during periods of thunderstorms and lightning.

10.1 EQUIPMENT

Appropriate parts of excavating equipment and other large equipment used will be fully decontaminated prior to leaving the site. Decontamination will consist of using a high-pressure hot water or steam cleaning unit. Additional scrubbing may be required for removal of all encrusted materials.

10.2 PERSONNEL

Personnel Decontamination Stations will be set up. Personnel will become thoroughly familiar with the following decontamination procedure before work begins in Exclusion Zones:

1. Place equipment and/or samples in area designated; move to next area (areas marked with signs if necessary).
2. Removal disposable coveralls, booties, and outer gloves and place in plastic bags (in 55-gallon drum).
3. Wash boots using (i) soap (Alconox or equivalent) in water solution and (ii) potable water rinse.
4. Remove respirator (if used) and wash and store according to manufacturer's instructions.
5. Remove disposable inner gloves (if used) and place in plastic bag (in 55-gallon drum).
6. Wash hands and face with water and hand soap.

HSCP SECTION ELEVEN

Emergency Procedures

The SSO will post the following list of telephone numbers by the telephone in the Command Post Trailer.

Agency Name (and Address)	Telephone No.
Ambulance	911
Fire Department	911
Police Department	911
Ashtabula County Medical Center 2420 Lake Avenue Ashtabula, Ohio 44004	440-997-6600
URS Greiner Woodward Clyde Health & Safety Manager Solon – Ken Armstrong	(216) 241-7312
	Home (216) 382-0451
Corporate - Phil Jones	(215) 542-3800
Environmental Protection Agency Ohio Emergency	(800) 282-9378
Ohio EPA	(614) 466-8500
Federal (Region V)	(312) 353-2072
USEPA Environmental Response Team	(201) 321-6660
Chem-Tel (24-HOUR EMERGENCY SPILL RESPONSE INFO) (for a spill of DNAPL, use Code Word "DET DNAPL")	(800) 255-3924

11.1 EMERGENCY EQUIPMENT

- First Aid kit,
- Eye, hand and body wash,
- Fire extinguisher,
- Hand-held horn or whistle.

11.2 EVACUATION ROUTE

Upon arrival at the site, the SSO will determine all possible evacuation routes and review those with field personnel during the first on-site briefing and periodically thereafter. The SSO will also drive the hospital route prior to commencement of site work.

11.3 HOSPITAL ROUTE

Exiting the site to State Road, turn left (south) travel approximately 0.75 mile turn right (west) at the first road which is east 21st Street. You will cross State Route 11 continue on to the stop sign. At the stop sign turn left (south) onto Columbus Avenue for approximately 0.25 miles turn right (west) at the flashing light onto east 23rd. Travel on east 23rd to the stop sign at Harbor avenue. Turn left (south) on Harbor and then an immediate right onto east 24th street. The hospital is on the south east corner of east 24th street and Lake Avenue.

11.4 EMERGENCY SIGNAL

Hand-held horn or whistle; hand signals (if full-face respirators are worn). Signals are to be reviewed by SSO at the initial on-site briefing and periodically thereafter.

Implementation of the provisions of this Health and Safety Plan must be completely documented. The SSO should set up a separate file to receive health and safety related records and activity reports. This file should contain the following records:

- Copies of the URSGWC Health and Safety Compliance Agreement (attached) documenting health and safety briefings and personnel signatures,
- Copies of safety equipment operation manuals,
- Records of usage and calibration of environmental monitoring equipment,
- Employee injury/exposure incident reports (see **Appendix B**),
- Records of safety violations and remedial actions taken, and
- Documentation of subcontractors' compliance with URSGWC requirements for health and safety training and medical monitoring.

A health and safety field logbook will be maintained on-site and should contain such information as: weather conditions, employees and visitors on site, level of personal protection worn, monitoring instrument readings (average, peak, and background), and subjects discussed during site health and safety briefings and names of attendees. In addition, any deviations from the SSP must be noted in the logbook.

All field personnel, including subcontractors, must sign the URSGWC Employee Health and Safety Compliance Agreement indicating that they have attended a briefing by the SSO, and that they understand and agree to abide by the provisions of this SSP, prior to working at the site.

HSCP SECTION THIRTEEN

Field Personnel

NAME	COMPANY	PROJECT FUNCTION
To Be Determined	URSGWC	Field Manager / SSO
Ken Armstrong	URSGWC-Cleveland	Health & Safety Manager
Martin L. Schmidt	URSGWC- Cleveland	Project Manager

HSCP SECTION FOURTEEN Employee Health & Safety Compliance Agreement

I, the undersigned, have received copy of the Health and Safety Plan identified below. I have read the plan, understand it, and agree to comply with all of the health and safety directives. I have attended a site briefing given by the Site Safety Officer or Health and Safety Officer. I understand that I may be prohibited from working on the project for violating any of the directives.

Project No.: 38-08E06011.00
Site Name: Detrex Corporation
Project Name: Source Control Remedial Action

Print Name: _____

Firm: _____

Signature

Date

USEPA, Feasibility Study Fields Brook Site Sediment Operable Unit, Ashtabula, Ohio, EPA 19.5L46.0, July 1986.

USEPA, Final Remedial Investigation Report, Fields Brook Site, Ashtabula, Ohio, WA 19.5L46.0, W65246.C, March 1985.

USEPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, OSWER Directive 9355.3-01, Review Draft, March 1988.

USEPA, Record of Decision, Remedial Alternative Selection, R.E. Fields Brook Site, 1986.

USEPA, Sediment Operable Unit Engineering Design Investigation Statement of Work, Field Brook, Ashtabula, Ohio, March 1989.

URSGWC, Site Safety Plan, Fields Brook Source Control RI/FS, November 1989.

TABLES



TABLE 1
CHEMICALS OF CONCERN DETECTED IN SOIL AND GROUNDWATER
DETREX CORPORATION
ASHTABULA, OHIO

Compounds

Total PCBs

Chloroform

1,2 trans-Dichloroethene*

Hexachlorobutadiene*

Hexachlorobenzene*

Hexachloroethane

Methylene Chloride*

1,2-Dichlorobenzene

1,1-Dichloroethene

1,1,2,2-Tetrachloroethane*

Tetrachloroethene*

1,2,4-Trichlorobenzene

1,1,2-Trichloroethane*

Trichloroethene*

Vinyl Chloride*

Bis(2-ethylhexyl)phthalate

Arsenic

Chromium

Lead

Nickel

Zinc

Note:

1. Data collected during the 1993 Source Control Investigation.

TABLE 2
SELECTED CHEMICALS OF CONCERN
DETREX CORP. - ASHTABULA, OHIO

Chemical	Exposure Limit(1)			Odor Threshold	Symptoms of Acute Exposure	Ionization Potential (eV)
	ACGIH TLV	OSHA PEL	NIOSH REL			
CHLORINATED ORGANIC COMPOUNDS						
Chlorobenzene	10	75	--	0.2	Eye, nose & skin irritation; drowsiness	9.07
Chloroform(3)	10	50	2	100	Eye & skin irritation; dizziness; nausea; headache	11.42
1,2 trans-Dichloroethene	200	--	--	--	Eye irritation, nausea, dizziness	--
Hexachlorobenzene*	200	--	--	--	Skin, eye & respiratory irritation; diarrhea	--
Hexachlorobutadiene*	0.02	--	0.02	--		
Methylene chloride(3)*	50	500	75	200	Eye & skin irritation; fatigue; weakness; lightheadedness; headache	11.35
PCB 1254*	.5mg/m ³	.5mg/m ³	.10mg/m ³	--	Eye & skin irritation; nausea; vomiting; chloracne	--
1,1,2,2-Tetrachloroethane*	1	5	1	--	Eye & skin irritation; nausea; vomiting; abdominal pain	11.1
Tetrachloroethylene	50	100	--	50	Eye, nose & throat irritation; headache; dizziness	9.32
1,2,4-Trichlorobenzene	--	5(4)	--	--	Notes & irritation	
1,1,2-Trichloroethane*	10		25	--	Eye, nose & skin irritation; dizziness	--
Trichloroethylene	50		25	20	Vertigo; vision distortion; tremors; eye & skin irritation	9.47
Vinyl chloride(3)*	5		--	--	Drowsiness; blurred vision; numbness in feet and hands	9.995

Woodward-Clyde

TABLE 2, CONTINUED
SELECTED CHEMICALS OF CONCERN
DETREX CORP. - ASIITABULA, OHIO

Chemical	Exposure Limit(1)			Odor Threshold	Symptoms of Acute Exposure	Ionization Potential (eV)
	ACGIH TLV	OSHA PEL	NIOSH REL			
<u>PHTHALATE ESTERS</u>						
Diethyl phthalate	5mg/m ³	--	--	--	Eye, nose & skin irritation; cough; lacrimation	--
Bis(2-ethylhexyl)phthalate	5mg/m ³	5mg/m ³	--	--	Eye & skin irritation; abdominal pain; nausea	--
<u>METALS</u>						
Arsenic*	.2mg/m ³	.010mg/m ³	.002mg/m ³	--	Dermatitis; nausea; vomiting; abdominal pain	--
Cadmium* (dust)	--	.05mg/m ³	.2mg/m ³	--	Eye & skin irritation; headache; weakness	--
Copper	1mg/m3	--	1mg/m3	--	Irritation of mucus membrane and pharynx; nasal perforation; eye and skin irritation; metallic taste	--
Chromium VI*	100mg/m ³	.1mg/m ³ (4)	.1mg/m ³	--	Lung irritation	--
Lead	.15mg/m ³	0.05mg/m ³	0.1/m ³	--	Headache; abdominal pain; vomiting; muscle ache	--
Mercury	.05mg/m ³	0.1/m ³	.05/m ³	--	Skin irritation; cough; metallic taste; thirst; abdominal pain; vomiting	--
Nickel	1mg/m3	--	1mg/m3	--	Allergic asthma; pneumonitis; sensitized dermal area; inflammation of nasal cavity	--
Selenium	.2mg/m ³	.2mg/m ³	--	--	Eye & nose irritation; skin burns; nausea	--
Zinc	--	--	--	--	Skin irritation; thirst; cough; weakness	--

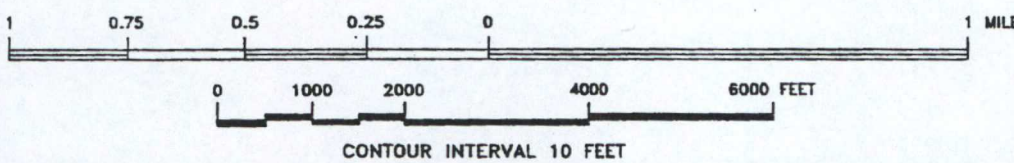
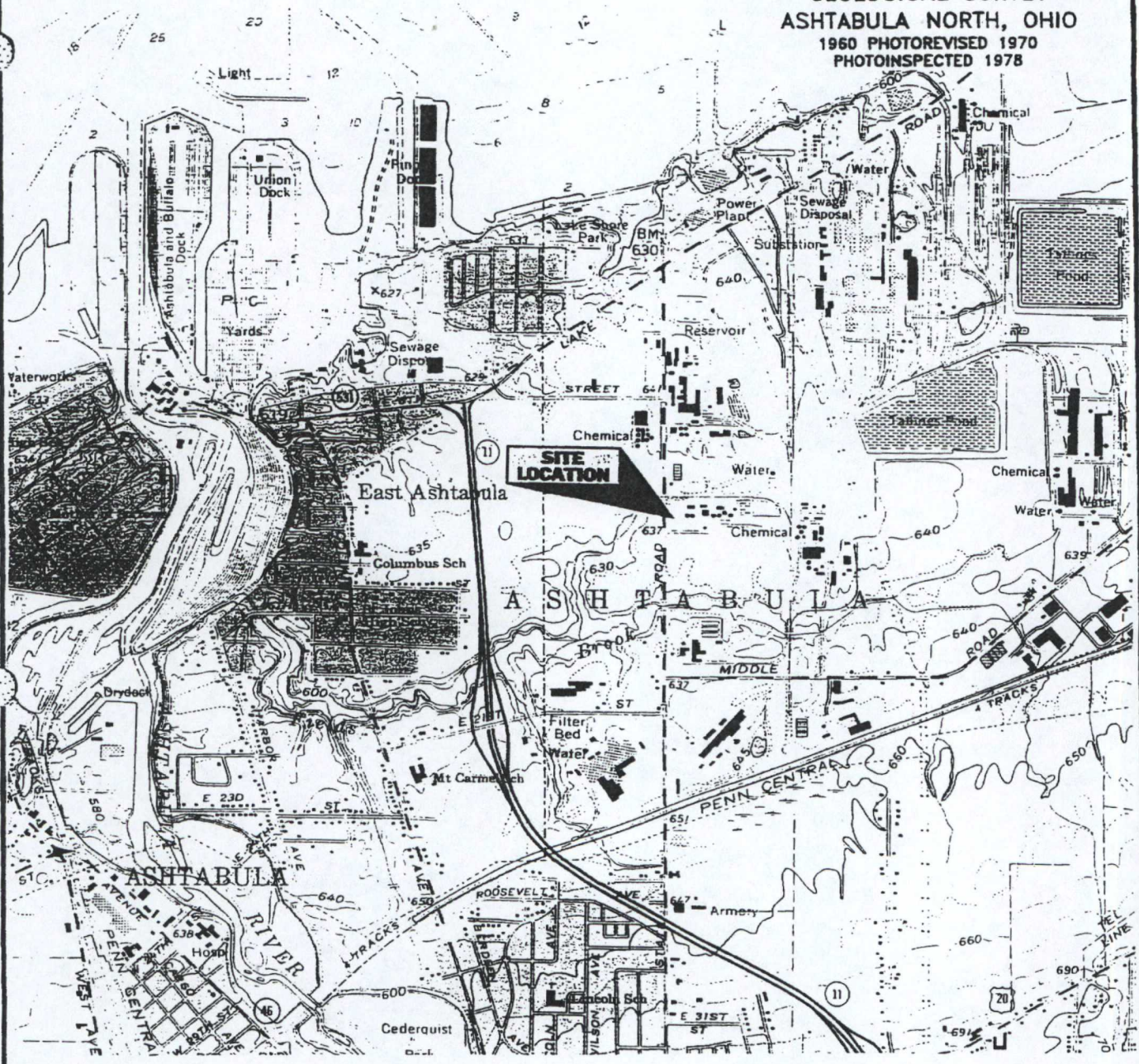
Notes:

1. In parts per million (ppm) unless otherwise noted.
2. Odor threshold data from Hazline chemical data sheets (see att'd.), except where noted.
3. Chemical is not considered to have adequate warning properties.
4. Ceiling limit
5. Chemical in carcinogenic nitrosamine family.
6. Historical data from Fields Brook investigation.
- * Known or suspected human carcinogen.
- Not applicable or not known.

ACGIH = American Conference of Governmental Industrial Hygienists
I.P. = Ionization Potential (for Photoionization Detector)
NIOSH = National Institute for Occupational Safety and Health
OSHA = Occupational Safety and Health Administration
PEL = Permissible Exposure Limit (8-hour Average)
REL = Recommended Exposure Limit (8-hour Average)
TLV = Threshold Limit Value (8-hour Average)

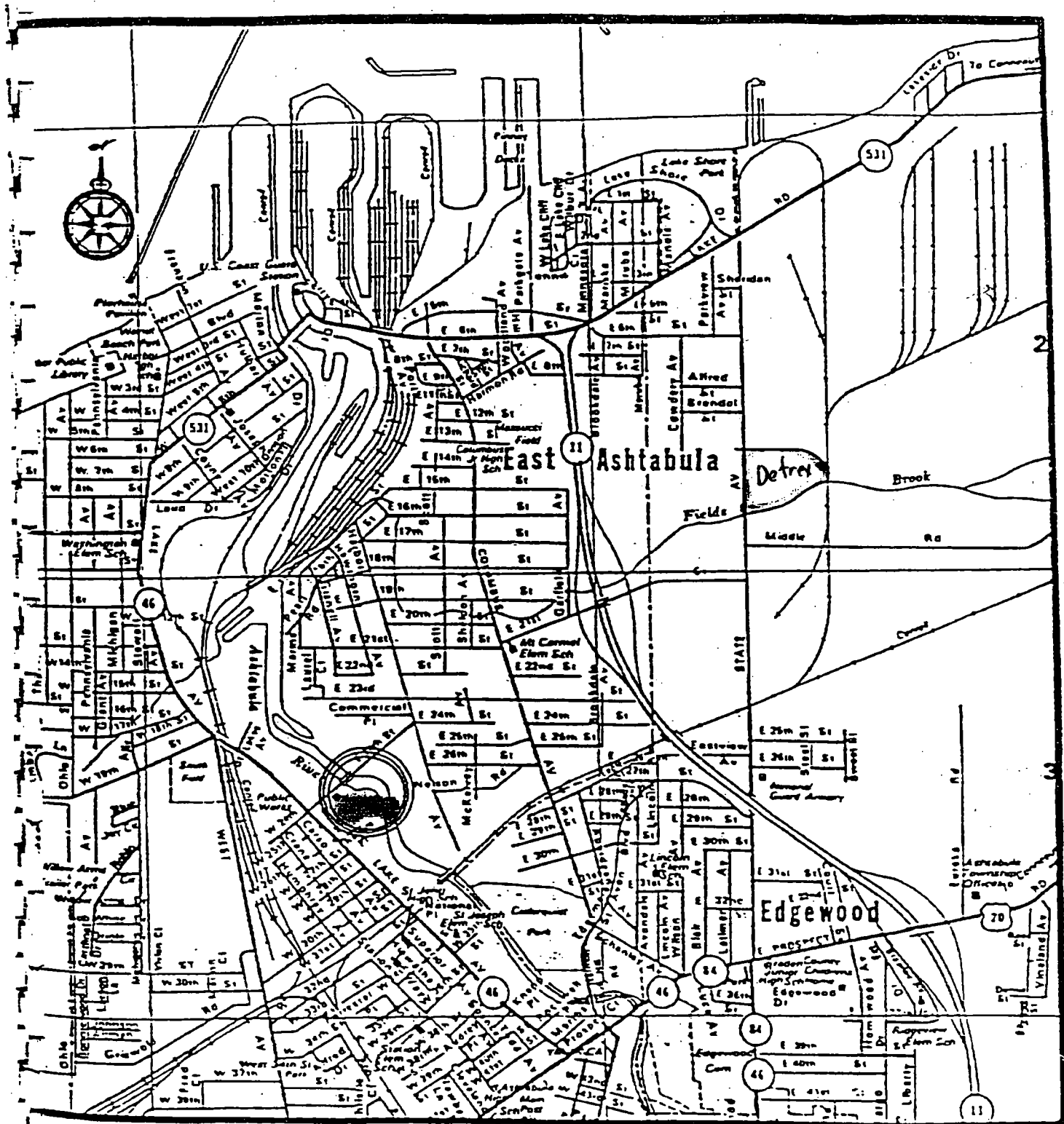
FIGURES

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ASHTABULA NORTH, OHIO
1960 PHOTOREVISED 1970
PHOTOINSPECTED 1978



GENERAL LOCATION MAP
DETREX CORPORATION - ASHTABULA, OHIO

DRAWN BY: MMS	CHECKED BY: DAS	PROJECT NUMBER: BE06033	DATE: 04-29-98	FIGURE NO: 1
---------------	-----------------	-------------------------	----------------	--------------



HOSPITAL ROUTE MAP
FIELDS BROOK PROJECT

APPENDIX A

OPERATING PROCEDURES NO. HS-201

201.0 HEAT STRESS

201.1 PURPOSE

The purpose of this Operating Procedure is to provide general information on heat stress and the methods that can be utilized to prevent or minimize the occurrence of heat stress.

Adverse climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability. Heat stress is of particular concern while wearing impermeable protective garments, since these garments inhibit evaporative body cooling.

201.2 TYPES OF HEAT STRESS

Heat stress is the combination of environmental and physical work factors that constitute the total heat load imposed on the body. The environmental factors of heat stress are the air temperature, radiant heat exchange, air movement, and water vapor pressure. Physical work contributes to the total heat stress of the job by producing metabolic heat in the body in proportion to the intensity of the work. The amount and type of clothing also affects heat stress.

Heat strain is the series of physiological responses to heat stress. When the strain is excessive for the exposed individual, a feeling of discomfort or distress may result, and, finally, a heat disorder may ensue. The severity of strain will depend not only on the magnitude of the prevailing stress, but also on the age, physical fitness, degree of acclimatization, and dehydration of the worker.

Heat disorder is a general term used to describe one or more of the heat-related disabilities or illnesses shown in Table 201-1.

201.3 METHODS OF CONTROLLING HEAT STRESS

As many of the following control measures, as appropriate, should be utilized to aid in controlling heat stress:

- Provide for adequate liquids to replace lost body fluids. Encourage personnel to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
- Replace body fluids primarily with water, with commercial mixes such as Gatorade or Quick Kick used only as a portion of the replacement fluids. Avoid excessive use of caffeine drinks such as coffee, colas or tea.
- Establish a work regimen that will provide adequate rest periods for cooling down. The heat exposure Threshold Limit Values (TLV) may be used for guidelines.
- Provide shaded work areas, if possible.
- Wear cooling devices such as vortex tubes or cooling vests.
- Consider adjusting work hours to avoid the worst heat of the day.
- Take breaks in a cool rest area.
- Remove any impermeable protective garments during rest periods.
- Do not assign other tasks to personnel during rest periods.
- Inform personnel of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

201.6 MONITORING

201.6.1 Temperature

The environmental heat stress of an area can be monitored by the Wet Bulb Globe Temperature Index (WBGT) technique. When heat stress is a possibility, a heat stress monitoring device, such as the Wibget Heat Stress Monitor (Reuter Stokes) can be utilized.

The WBGT shall be compared to the TLV outlined by the American Conference of Governmental Industrial Hygienists (ACGIH) TLV guides, and a work-rest regimen can be established in accordance with the WBGT. Note that approximately 5°C must be subtracted from the TLVs listed for heat stress to compensate for the wearing of impermeable protective clothing.

201.6.2 Medical

In addition to the provisions of the Woodward-Clyde (W-C) medical surveillance program, on-site medical monitoring of personnel should be performed for projects where heat stress is a significant concern. Blood pressure, pulse, body temperature (oral), and body weight loss may be utilized.

Heart Rate: Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third. If the heart rate still exceeds 110 beats per minute at the next rest cycle, shorten the following work cycle by one-third.

Oral Temperature: Use a clinical thermometer or similar device to measure the oral temperature at the end of the work period (before drinking liquids). If the oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period. If the oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear a semipermeable or impermeable garment if his/her oral temperature exceeds 100.6°F (38.1°C).

Body Water Loss: Measure body weight on a scale accurate to ± 0.25 pounds at the beginning and end of each work day (also at lunch break, if possible) to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, nude. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

Physiological Monitoring: Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The length of the work cycle will be governed by the frequency of the required physiological monitoring.

201.7 REFERENCES

American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents, 1992-1993.

EPA, Standard Operating Safety Guides, 1992, Pages 91-93.

National Institute for occupational Safety and Health, Criteria for a Recommended Standard: Occupational Exposure to Hot Environments, 1986.

TAB 201-1

Classification, Medical Aspects, and Prevention of Heat Illness

Category and Clinical Features	Predisposing Factors	Underlying Physiological Disturbances	Treatment	Prevention
Temperature Regulation Heatstroke Heatstroke: (1) Hot, dry skin; usually red, mottled, or cyanotic; (2) rectal temperature 40.5°C (104°F) and over; (3) confusion, loss of consciousness, convulsions, rectal temperature continues to rise; fatal if treatment is delayed	(1) Sustained exertion in heat by unacclimatized workers; (2) lack of physical fitness and obesity; (3) recent alcohol intake; (4) dehydration; (5) individual susceptibility; and (6) chronic cardiovascular disease	Failure of the central drive for sweating (cause unknown) leading to loss of evaporative cooling and an uncontrolled accelerating rise in t_{re} ; there may be partial rather than complete failure of sweating	Immediate and rapid cooling by immersion in chilled water with massage or by wrapping in wet sheet with vigorous fanning with cool dry air; avoid overcooling; treat shock if present	Medical screening of workers, selection based on health and physical fitness; acclimatization for 5-7 days by graded work and heat exposure; monitoring workers during sustained work in severe heat
Circulatory Hypostasis Heat Syncope Fainting while standing erect and immobile in heat	Lack of acclimatization	Pooling of blood in dilated vessels of skin and lower parts of body	Remove to cooler area; rest in recumbent position; recovery prompt and complete	Acclimatization; intermittent activity to assist venous return to heart
Water and or Salt Depletion (a) <u>Heat Exhaustion</u> (1) Fatigue, nausea, headache, giddiness; (2) skin clammy and moist; complexion pale, muddy, or hectic flush; (3) may faint on standing with rapid thready pulse and low blood pressure; (4) oral temperature normal or low, but rectal temperature usually elevated (37.5-38.5°C or 99.5-101.3°F); water restriction type: urine volume small, highly concentrated; salt restriction type; urine less concentrated chlorides less than 3 g/L (b) <u>Heat Cramps</u> Painful spasms of muscles used during work (arms, legs, or abdominal); onset during or after work hours	(1) Sustained exertion in heat; (2) lack of acclimatization; and (3) failure to replace water lost in sweat (1) Heavy sweating during hot work; (2) drinking large volumes of water without replacing salt loss	(1) Dehydration from deficiency of water; (2) depletion of circulating blood volume; (3) circulatory strain from competing demands for blood flow to skin and to active muscles Loss of body salt in sweat, water intake dilutes electrolytes; water enters muscles, causing spasm	Remove to cooler environment; rest in recumbent position; administer fluids by mouth; keep at rest until urine volume indicates that water balances have been restored Salted liquids by mouth or more prompt relief by IV infusion	Acclimatize workers using a breaking-in schedule for 5-7 days; supplement dietary salt only during acclimatization; ample drinking water to be available at all times and to be taken frequently during work day Adequate salt intake with meals; for unacclimatized workers, supplement salt intake at meals.

TABLE 201 (Continued)
Classification, Medical Aspects, and Prevention of Heat Illness

Category and Clinical Features	Predisposing Factors	Underlying Physiological Disturbances	Treatment	Prevention
Skin Eruptions (a) <u>Heat Rash</u> (miliaria rubra, or "prickly heat") Profuse tiny raised red vesicles (blisterlike) on affected areas; prickling sensations during heat exposure (b) <u>Anhidrotic Heat Exhaustion</u> (miliaria profunda) Extensive areas of skin which do not sweat on heat exposure, but present gooseflesh appearance, which subsides with cool environments; associated with incapacitation in heat	Unrelieved exposure to humid heat with skin continuously wet from unevaporated sweat Weeks or months of constant exposure to climatic heat with previous history of extensive heat rash and sunburn	Plugging of sweat gland ducts with sweat retention and inflammatory reaction Skin trauma (heat rash; sunburn) causes sweat retention deep in skin; reduced evaporative cooling causes heat intolerance	Mild drying lotions; skin cleanliness to prevent infection No effective treatment available for anhidrotic areas of skin; recovery of sweating occurs gradually on return to cooler climate	Cool sleeping quarters to allow skin to dry between heat exposures Treat heat rash and avoid further skin trauma by sunburn; provide periodic relief from sustained heat
Behavioral Disorders (a) <u>Heat Fatigue - Transient</u> Impaired performance of skilled sensorimotor, mental, or vigilance tasks, in heat (b) <u>Heat Fatigue - Chronic</u> Reduced performance capacity; lowering of self-imposed standards of social behavior (e.g., alcoholic over-indulgence); inability to concentrate, etc.	Performance decrement greater in unacclimatized and unskilled worker Workers at risk come from temperature climates for long residence in tropical latitudes	Discomfort and physiologic strain Psychosocial stresses probably as important as heat stress; may involve hormonal imbalance but no positive evidence	Not indicated unless accompanied by other heat illness Medical treatment for serious causes; speedy relief of symptoms on returning home	Acclimatization and training for work in the heat Orientation on life in hot regions (customs, climate, living conditions, etc.)

OPERATING PROCEDURE NO. HS-204

204.0 SAFETY PROCEDURES FOR TRENCH CONSTRUCTION AND OTHER EXCAVATING OPERATIONS

204.1 PURPOSE

This procedure contains an overview of the safety requirements for excavating and trenching operations. The requirements are consistent with standards established by the Occupational Safety and Health Administration (OSHA) and described in Title 29 Code of Federal Regulations (CFR) 1926.650. The detailed OSHA standard was effective in January 1990 and should be consulted before design of a shoring system, with questions regarding sloping options, or before working as a "competent person" on an excavation site.

204.2 RESPONSIBILITY

The responsibility and authority for excavating and trenching safety must be well defined prior to project start-up. In general, the contractor will assume responsibility for excavation safety and Woodward-Clyde (W-C) will maintain safety responsibility and authority only for W-C and W-C subcontractor employees. W-C employees will not serve in the OSHA defined role of "competent person" unless specifically defined in the project scope of work and approved by the Project Manager (PM) and Management Oversight Reviewer (MOR). The PM shall ensure that the W-C field staff clearly understands the limitation of their excavation safety responsibilities and authorities.

W-C employees are responsible for understanding the general excavation safety requirements and for not entering improper trenches or excavations.

204.3 APPLICABILITY

This procedure is applicable to all W-C projects in which trenching or other excavating operations, exclusive of borings, are entered by W-C personnel or personnel employed by firms under contract to W-C. It is also applicable to W-C projects requiring W-C personnel

or personnel of firms under contract to W-C to enter trenches and other types of excavations.

The best approach for avoiding the detailed trenching requirements is to perform sampling and other procedures without entry into excavations. Use of a backhoe to bring up samples, use of long-handled sampling devices, and similar techniques are recommended.

204.4 REQUIREMENTS

204.4.1 Preliminary Requirements

Certain government agencies (e.g. California) require a permit to perform excavation operations.

Before digging, determine or have the client determine if underground installations, such as sewer, water, fuel, or electrical lines are to be encountered, and if so, determine the exact locations of the lines. Information can be obtained by contacting Underground Service Alert (consult local telephone directory for toll-free number), local utility companies, and the owner of the property on which excavating operations are planned.

Trees, boulders, and other surface encumbrances, located so as to pose a potential hazard to employees must be removed or made safe before the operation begins.

204.4.2 Placement of Excavated Materials

Excavated materials must be placed at least two feet back from the edge of the excavation and precautions must be taken to prevent the materials from falling into the excavation.

204.4.3 Working in Excavations

Shoring and Sloping

Except for solid rock, trenches in which personnel are required to work must be shored or sloped if the depth of the excavation is five (5) feet or more. When a shoring system is used, it shall consist of hydraulic shores or the equivalent, with sheathing or sheet piling as needed. Trench boxes are also permitted. OSHA uses a soil classification system to determine the allowable slopes for trenches. The shoring system must be properly designed and installed to sustain all existing and expected loads. For details on shoring and sloping requirements, consult Title 29 CFR, Subpart P, Sections 1926.650 to 1926.653 (attached).

Access

When work is to be performed in any excavation, safe access to the excavation must be provided by means of ladders, stairs, or ramps. Trenches four or more feet deep must have ladders spaced no less than 25 feet apart, and the ladders must extend at least three feet above grade.

Hazardous Atmospheres

At sites where oxygen deficiency or hazardous concentrations of flammable or toxic vapors or gases may be encountered in excavations, the atmosphere in the excavations must be tested by the site safety officer or other qualified person before work in an excavation begins and at appropriate intervals afterward. Trenches may be classified as confined spaces and require an entry permit as covered in HS-205, Confined Space Entry.

204.4.4 Inspection of Excavation

Excavations must be observed daily by the "competent person". If evidence for potential cave-ins or slides is apparent, all work in the excavation must be suspended until necessary steps have been taken to safeguard employees.

204.4.5 Operations of Vehicles Near Excavations

When vehicles or heavy equipment must operate near an excavation, the sides of the excavation must be shored or braced as necessary to withstand forces exerted by the superimposed load and the earth pressure. Stop logs or other types of secure barriers must be installed at the edges of the excavations.

204.4.6 Bell-Bottom Pier Holes

Employees entering drilled pier holes must be protected by a casing proportioned to sustain the maximum stresses imposed by earth and water or slurry that extends the full depth of the shaft and to the bottom of the bell. A safety cage or a shoulder harness secured to a full-time tended lifeline shall be required for entry and exit. Air monitoring and related requirements of HS-205, Confined Space entry, shall be followed.

204.4.7 Bridges and Walkways

Walkways or bridges with standard guardrails must be provided where employees or equipment are required or permitted to cross over excavations. Pedestrian walkways shall be of sufficient strength to permit a vertical deflection of no more than 0.5 inch when a 250-pound weight is applied to the center of the walkway. All bridges intended for vehicular traffic must be constructed to withstand twice the load of the heaviest vehicle expected.

204.4.8 Barricades and Fences

Excavated areas must be completely guarded on all sides with barricades or fences, as appropriate. If barricades are used, they must be spaced no more than 20 feet apart and

shall not be less than 35 inches high when erected. A yellow or yellow and black tape, at least 0.75 inches wide, shall be stretched between the barricades.

204.4.9 Backfilling

Excavated areas must be backfilled in accordance with the work plan as soon as practical after work is completed, and all associated equipment must be removed from the area.

204.5 EXCAVATIONS NEXT TO EXISTING STRUCTURES

A registered engineer will review all plans for excavations next to existing structures to avoid undermining the structures and possible collapse.

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

1. Applicability

This procedure applies to URS projects involving confined space entry operations.

2. Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with confined space entry.

A confined space is:

1. Large enough for personnel entry, and
2. Has limited or restricted means for entry or exit, and
3. Is not designed for continuous occupancy.

A Non-Permit space is a confined space that does not present any potential hazards, nor will the work performed therein create a hazardous condition.

A Permit-Required space is a confined space that may present one or more potential hazards including hazardous atmospheres, fire/explosion, engulfment, entrapment, electrical, mechanical, or any other serious hazard. (Note for Australian operations - all confined space entries require a permit)

Permit required confined space hazards include risks of asphyxiation, fire or explosion, chemical exposure, engulfment or drowning, electrocution, or dismemberment. Examples include, but are not limited to, sewers, utility vaults, tanks, sump pits, and excavations where there is the potential for atmospheric hazards.

This procedure applies to all permit required confined space entry activities performed by URS or any contractor and/or subcontractor.

Entry occurs whenever any body part crosses the plane of entry of the space.

3. Implementation

Field Operations - Implementation of this program is the responsibility of the Project Manager and Entry Supervisor.

4. Requirements

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

A. Appoint an Entry Supervisor who:

1. Determines whether a space is a "permit required" or non permit space.
2. Is responsible for onsite verification of acceptable entry conditions prior to entry.
3. Is responsible for assigning appropriately trained and medically qualified personnel to the project.
4. Has knowledge of required confined space entry equipment.
5. Has the ability to recognize and test hazardous atmospheres.
6. Is capable of performing a thorough hazard evaluation of the space and of the work that will be performed therein.
7. Understands how to execute a Confined Space Permit as well as any other required permit, such as a Hot Work permit.
8. Has authority to stop work and take corrective actions when conditions change.
9. Has had formal, documented training as a confined space Entry Supervisor.

B. Permit System

1. Utilize the "Confined Space Entry Permit and Procedures" form, Attachment 10-1, for permit space entry evaluation and establishment of required entry parameters.
2. Require confined space entry permits to be issued at least each shift by the Entry Supervisor.

C. Planning for Confined Space Entry

1. The Entry Supervisor:
 - a. Contacts the facility representative to gather information about the confined space and to determine if the facility has any entry requirements that must be followed.

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

- b. Performs a Hazard Evaluation using the Confined Space Permit and Procedures for Entry Form, Attachment 10-1.
- c. Determines whether the space is a "permit required confined space" or a non-permit required confined space.
- d. Assesses whether those hazards that create the "permit required confined space" can be eliminated without employee entry into the space. By eliminating hazards that are immediately dangerous to life or health, administrative and rescue requirements are lessened and risk to workers is reduced.
- e. Determines rescue requirements for the space - if so designated as a "permit required confined space".
- f. Arranges for qualified Entrants and Attendants.
- g. Obtains blank Confined Space Entry and Hot Work (if applicable) permit forms.
- h. Identifies all equipment, including personal protective equipment, needed for the job.
- i. Obtains all equipment and verifies that it is functional.
- j. Coordinates confined space entry activities with other site employers on site that may be affected by the entry. Will provide contractors with a copy of this written program.

D. Site Confined Space Preparation

1. Space Isolation

- a. Verify the confined space is drained and cleaned.
- b. Isolate the confined space as described on the Hazard Evaluation form or other applicable written procedures.
- c. Isolate all forms of potential energy inside the confined space, including:
 - 1. Electrical
 - 2. Mechanical

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

3. Thermal

4. Pneumatic

5. Hydraulic

- d. Isolate all lines carrying fuels, liquids or gases into the space.
- e. Develop alternate procedures for protection of entrants for lines, which may not be controlled such as lines through stormwater or sewer vaults.
- f. Open the entry point to the confined space.
- g. Provide barricades and post the entrance of the space with a sign stating "Danger Confined Space Do Not Enter" or equivalent wording.

2. Electrical Equipment

- a. Provide electrical equipment that meets the electrical classification of the area. See SMS 12, "Electrical Safety".
- b. Route all portable electrical equipment through ground fault circuit interruption (GFCI) devices.

3. Atmospheric Tests

- a. Calibrate monitoring equipment and record information on the Daily Instrument Calibration Form.
- b. Make initial atmospheric tests of the space.
- c. Attach extension probes to the monitoring equipment, or lengths of silicone or similarly inert tubing material, to reach the bottom of the space. For horizontal spaces, the probe may need to be attached to a pole.
- d. Take atmospheric measurements in several locations (bottom, middle, top, corners) allowing extra response time from the instrumentation to register, especially if a tubing extension is used.

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

- e. Obtain reading for oxygen first, followed by %LEL, then for other contaminants of concern (if applicable).
- f. Record all results on the permit and sign and initial where indicated.
- g. Determine if acceptable entry conditions exist with respect to oxygen, %LEL, other hazardous atmospheres.
- h. If unacceptable entry conditions are indicated, correct the limiting condition.
- i. If acceptable entry conditions exist, determine times that the monitoring will be repeated or if continuous monitoring will be needed.
- j. Monitor continuously for oxygen and %LEL if hot work will be performed in the space.

4. Ventilation

- a. Mechanical ventilation is required for all Permit entries.
- b. Open as many openings as possible in the space to aid in cross ventilation.
- c. Never ventilate confined spaces with oxygen.
- d. Provide five (5) air changes per hour, or at least 10,000 cfm for large spaces.
- e. If a generator is used to provide power, be sure that the exhaust does not enter the space. Carbon monoxide monitoring may be required.
- f. Place blower ductwork such that it does not create a hazard by impairing the line of vision of attendants to observe space entrants, or by blowing contaminants to other workers.
- g. Provide at least 2,000 cfm of active exhaust ventilation for each welder or torch operating under a Hot Work Permit within the space.

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

- h. Use fire/explosive proof ventilating equipment that is properly grounded when exhausting flammable gases, vapors and dusts from confined spaces.

5. Authorizing the Permit

- a. The Entry Supervisor personally inspects the work area and signs the permit after confirming that all necessary precautions have been taken and all relevant information concerning the entry parameters are documented on the permit.
- b. Conduct a briefing informing all entrants and attendants of space conditions.
- c. Require entrant(s) and attendant(s) to each print their names and sign the permit.
- d. Affix the permit to a location near the space entrance.

E. Entry Operations

- 1. Prohibit entry when oxygen deficient or flammable atmospheres are present in the space.
- 2. Limit entry to qualified entrants listed on the permit and only for the purpose stated on the permit.
- 3. Require entrants to follow all requirements listed on permit.
- 4. Attach body harness, if required, to a lifeline, and the other end of the life line is attached to a fixed point or to a mechanical lifting device outside the space at all times the entrant(s) are in the space.
- 5. Require that the attendant(s) remain at the entrance whenever an entrant is inside the confined space. The attendant may not be assigned other duties that may distract him/her from maintaining uninterrupted contact with the entrant(s). The attendant may only attend to one confined space entry at any one time. Each space must have its own attendant.

F. Exiting the Confined Space

- 1. Attendant will order entrant(s) out of space whenever:

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

- a. A prohibited condition on the entry permit develops.
- b. The surrounding work area becomes unsafe.
- c. Any monitoring instrumentation, rescue equipment, ventilation, etc. becomes compromised.
- d. Possible symptoms of exposure are noted in the entrant(s).
- e. Entrant(s) express any type of concern regarding the safety of the entry.

G. Rescue

1. Require non-entry rescue procedures to be used for every entry. Typically, non-entry rescue will require the use of a tripod and winch, lanyard, and full body harness.
2. Contract for qualified entry rescue services when non-entry rescue is not feasible in permit required confined spaces. Entry rescue must staged on site adjacent to the space for the duration of the entry.

H. When the Entry Work is Complete

Cancel the permit by obtaining the signature of the entry supervisor and recording the time and date on the permit. This should be accomplished after the space is resealed and signs and barricades removed. If the space cannot be closed until a later time, provisions must be maintained (barricades, warning signs) to discourage persons from entering the space.

I. Audits of the Confined Space Entry Program

Annual audits of this Safety Management Standard will be conducted in accordance with the procedures set forth in the URS HSMS.

The Project Manager will require compliance with this SMS by reviewing Entry Permits on a weekly basis and document this review by notation on the permits.

J. Training

URS SAFETY MANAGEMENT STANDARD

Confined Space Entry

Require Entry Supervisors, Entrants, and Attendants to be trained to adequately address all health and safety aspects associated with entry.

K. Medical Surveillance

All Entry Supervisors, Entrants, and Attendants will be participants in the Regional medical surveillance program and medically qualified for confined space entry work.

5. Documentation Summary

Records required in the Project Safety File

- A. Entry supervisor, Entrant and Attendant qualifications.
- B. Confined Space Entry Permits plus Hot Work Permits (if issued).
- C. Monitoring equipment calibration logs.
- D. Lock-out/Tag-out records (if used).
- E. Daily worker briefing documentation.
- F. Medical clearance documentation.

6. Resources

- A. U.S. OSHA Standard - Permit Required Confined Spaces - 29 CFR 1910.146
(http://www.osha-slc.gov/OshStd_data/1910_0146.html)
- B. U.S. OSHA Technical Links - Confined Spaces
(<http://www.osha-slc.gov/SLTC/confinedspaces/index.html>)
- C. U.K. - Factories Act
- D. Australian Standards AS 2865-1995. Safeworking in a Confined Space
- E. US Army Corp of Engineers - EM 385-1-1, Section 06.I.
(<http://www.usace.army.mil/inet/usace-docs/eng-manuals/em385-1-1/toc.htm>)
- F. Attachment 10-1 - Confined Space Permit and Procedures for Entry

URS Corporation

CONFINED SPACE PERMIT & PROCEDURES FOR ENTRY

Confined Space Name:	No.
Confined Space Location:	Date:
Entry Authorized By:	Time Issued:
	Time expires:

Reason(s) for Entry	Hazards

ISOLATION

Equipment to Lock/Tag/Test (including blocking, blanking, and/or disconnecting electrical, hydraulic, pneumatic, kinetic, thermal, steam, chemical, springs):

Equipment Name:	Isolated by:	Location:	Done

ENTRY REQUIREMENTS:	Required	Checked		Required	Checked
Eye Protection			Hot Work Permit		
- Safety Glasses			Communications		
- Goggles			Air Mover(s)		
- Face Shield			Rescue Hoist and Other Related Equipment		
Hearing Protection			Rescue Lanyard		
Fall Protection			GFCI Protected Electrical		
Respiratory Protection			Explosion Proof Lighting/Electrical		
- 1/2 Face Disposable			Non-sparking Tools		
- 1/2 Face Cartridge			Ladders		
- Full Face			Blocking/Blanking Equipment		
- Powered Air Purifying			Air Monitoring		
- Supplied Air			- Oxygen		
Gloves Type			- Combustibles		
Boots Type			- Carbon monoxide		
Clothing Type			- Hydrogen sulfide		
Hard Hat			- Dust		
Other			- Other		

Comments:

Atmospheric Testing	Pre-Entry		Continuous		Record readings every 30 minutes (minimum)			
	Needed	Time: Results/Initials	Needed	Time: Results/Initials	Time: Results/Initials	Time: Results/Initials	Time: Results/Initials	Time: Results/Initials
Oxygen (19.5-23.5%)								
Combustibles(<10%LEL)								
Carbon Monoxide (<35 ppm)								
Hydrogen Sulfide (<2 ppm)								
dust (visibility > 10')								
other								
other								

Note: Sign the permit and authorize entry only when the atmospheric conditions meet the permissible entry levels shown for a minimum period of 30 minutes prior to entry.

Name of Tester:

Signature:

Testing Equipment Used	Type	Model	LD. Number

Emergency Action Plan:

Authorization	Signature	Time/Date
Entry Supervisor: (print) I Certify that the requirements of this confined space entry permit have been met and I authorize entry into the confined space to which this permit applies.		
Relief Entry Supervisor: (print) I Certify that the requirements of this confined space entry permit have been met and I authorize entry into the confined space to which this permit applies.		
Entrants(s): (print)		
Attendant(s): (print)		

Permit Canceled by: _____ Date: _____ Time: _____
 Permit was cancelled because (check one): (i) Work has been completed _____ (ii) The permit has expired _____ (iii) Emergency (specify) _____

URS SAFETY MANAGEMENT STANDARD

Excavation Safety

1. Applicability

This procedure applies to projects where URS controls trenching and excavation activities, and/or where URS employees are exposed to hazards associated with trenching and excavation activities.

2. Purpose and Scope

This procedure is intended to protect personnel from the hazards associated with excavation entry activities.

3. Implementation

Field Operations - Implementation of this program is the responsibility of the Project Manager.

4. Requirements

A. Competent Person

Appoint an Excavation Competent Person when URS controls excavation activities. The Excavation Competent Person:

1. Is responsible for conducting daily inspections of excavation, adjacent areas, and protective systems prior to each shift.
2. Is responsible for inspection after every rainstorm or other hazard.
3. Must have knowledge of soils and soil classification.
4. Understands design and use of protective systems.
5. Has authority to stop work and take corrective actions when conditions change.
6. Has the ability to recognize and test hazardous atmospheres.
7. Has formal documentation of training as an Excavation Competent Person.
8. Is physically located at the excavation while work is in progress.

B. Access/Egress

URS SAFETY MANAGEMENT STANDARD

Excavation Safety

1. Trench excavations will have ramps or ladders within 25 feet (8 meters) of the entrants.

C. Soil Classification

Soil classifications must be conducted in accordance with Attachment 13-1. For the purposes of this standard all soils will be classified by a person meeting the qualifications of a competent person as described in 29 CFR 1929 subpart P. The competent person shall consult with a Registered Professional Engineer in the event the soil classification requires additional technical expertise.

D. Protective Systems

Protect employees in excavations deeper than 4 feet (1.2 meters) by means of properly designed protective systems. All protective systems must comply with 29 CFR 1926 Subpart P Appendices B, D, and E.

1. Sloping and Benching

See Attachment 13-2

2. Timber Shoring for Trenches

Timber shoring for trenches must be designed and stamped by a Registered Professional Engineer in accordance with 29CFR Subpart P, Appendix C.

3. Aluminum Hydraulic Shoring for Trenches

Aluminum hydraulic shoring for trenches must be approved by a Registered Professional Engineer in accordance with 29CFR 1926 Subpart P, Appendix D.

4. Alternatives to Timber Shoring

Trench shields and boxes must be either premanufactured with listed load ratings or designed, stamped and constructed under the direction of a Registered Professional Engineer.

5. Protective systems designed to protect employees in excavations deeper than 20 feet (6.1 meters) must be designed and stamped by a Registered Professional Engineer.

URS SAFETY MANAGEMENT STANDARD

Excavation Safety

6. Excavations will be clearly identified and barricaded to keep unauthorized individuals out.

E. Permit Authorization and Inspections

1. Use the Excavation Authorization Form (Attachment 13-3) of this procedure that requires the following issues to be addressed:
 - a. Employee training/briefings.
 - b. Electrical safety.
 - c. Surface encumbrances.
 - d. Underground installations and utilities.
 - e. Protective systems.
 - f. Access and egress.
 - g. Exposure to vehicular traffic.
 - h. Exposure to falling loads.
 - i. Warning systems for mobile equipment.
 - j. Testing for hazardous atmospheres.
 - k. Emergency rescue equipment.
 - l. Protection from hazards associated with water accumulation.
 - m. Stability of adjacent structures.
 - n. Protection of employees from loose rock.
 - o. Inspections.
 - p. Fall protection.
2. Require daily inspections of excavations to be conducted by Competent Person using Attachment 13-4.

F. Training/Briefings

URS SAFETY MANAGEMENT STANDARD

Excavation Safety

Conduct daily safety briefings for all employees associated with excavation activities and document on Attachment 13-3. Discuss excavation hazards, protective measures, and work practices that will be applicable to the day's activities.

5. Documentation Summary

Records required for the Project Safety File:

- A. Competent person qualifications.
- B. Excavation Authorization Form.
- C. Daily Competent Person inspections.
- D. Daily worker briefing documentation.
- E. Daily inspection records.

6. Resources

- A. U.S. OSHA Standard - Excavations - 29 CFR 1926, Subpart P

- 1. Appendix B, Sloping and Benching
- 2. Appendix C, Timber Shoring
- 3. Appendix D, Aluminum Hydraulic Shoring

- B. U.S. OSHA Technical Links - Trenching and Excavation

The following documents are PDF files requiring the use of Adobe Acrobat reader.

- C. US Army Corp of Engineers projects, the requirements of EM 385-1-1, Section 25 (PDF file)
- D. Attachment 13-1 - Soils Classification
- E. Attachment 13-2 - Simple Slopes
- F. Attachment 13-3 - Excavation Authorization Form
- G. Attachment 13-4 - Daily Excavation/Trench Inspection Form



SOILS CLASSIFICATION

Attachment 13-1

"Type A" soils

Are cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater.

Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A.

However, no soil is Type A if:

- i. The soil is fissured; or
- ii. The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- iii. The soil has been previously disturbed; or
- iv. The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- v. The material is subject to other factors that would require it to be classified as a less stable material.

"Type B" soils are:

- i. Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- ii. Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- iii. Previously disturbed soils except those which would otherwise be classed as Type C soil.
- iv. Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- v. Dry rock that is not stable; or
- vi. Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

"Type C" soils are:

- i. Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
- ii. Granular soils including gravel, sand, and loamy sand; or
- iii. Submerged soil or soil from which water is freely seeping; or
- iv. Submerged rock that is not stable; or
- v. Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

URS Corporation
URS Corporation Health & Safety Program

SIMPLE SLOPES

MAXIMUM ALLOWABLE SLOPES
 SOIL OR ROCK TYPE
 MAXIMUM ALLOWABLE SLOPES (H:V)¹
 FOR
 EXCAVATIONS LESS THAN 20 FEET DEEP³

STABLE ROCK	VERTICAL (90 Deg.)
TYPE A ²	3/4:1 (53 Deg.)
TYPE B	1:1 (45 Deg.)
TYPE C	1 1/2:1 (34 Deg.)

¹ Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

² A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53 degrees).

³ Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

Slope Configurations (All slopes stated below are in the horizontal to vertical ratio)

Excavations made in Type A soil.

All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of 3/4:1.



SIMPLE SLOPE - GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of 1/2:1.

URS Corporation
URS Corporation Health & Safety Program

SIMPLE SLOPES

MAXIMUM ALLOWABLE SLOPES
 SOIL OR ROCK TYPE
 MAXIMUM ALLOWABLE SLOPES (H:V)¹
 FOR
 EXCAVATIONS LESS THAN 20 FEET DEEP³

STABLE ROCK	VERTICAL (90 Deg.)
TYPE A ²	3/4:1 (53 Deg.)
TYPE B	1:1 (45 Deg.)
TYPE C	1 1/2:1 (34 Deg.)

¹ Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

² A short-term maximum allowable slope of 1 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53 degrees).

³ Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

Slope Configurations (All slopes stated below are in the horizontal to vertical ratio)

Excavations made in Type A soil.

All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of 3/4:1.

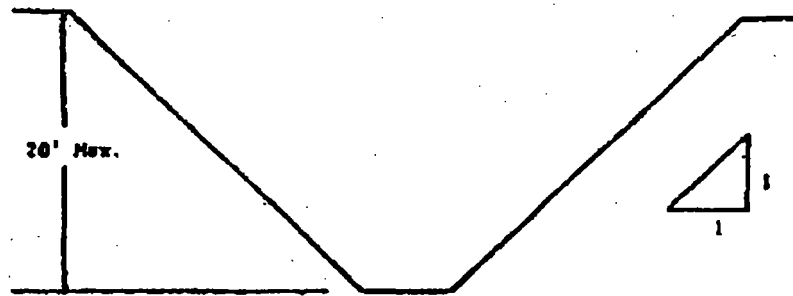


SIMPLE SLOPE - GENERAL

Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of 1/2:1.

Excavations Made in Type B Soil

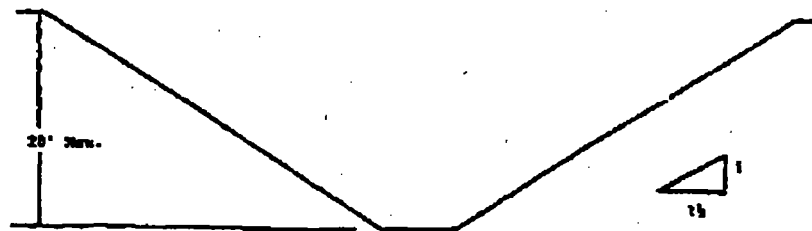
All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.



SIMPLE SLOPE

Excavations Made in Type C Soil

All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1 1/2:1.



SIMPLE SLOPE



Health and Safety Program

Attachment 13-3

**EXCAVATION / TRENCHING
AUTHORIZATION****POST AT LOCATION
(GOOD FOR ONE WEEK ONLY)**

Authorization No. _____ Authorization From _____ To _____

Competent Person: _____

Project Name: _____ Project Location: _____

Description of Job or Special procedures: _____

Check Yes, No, or N/A
for Not Applicable**EMPLOYEE TRAINING AND PRE-EXCAVATION BRIEFING**

1. Safe Excavation and Rescue Training Conducted on: _____ Date: _____			
2. Mandatory pre-excavation briefing conducted on: _____ Date: _____			
	Yes	No	N/A
3. Does this job require special training?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ELECTRICAL SAFETY

	Yes	No	N/A
1. Are all electrical devices grounded, double insulated, or GFCI protected?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Have all power cords and tools been visually inspected?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SURFACE ENCUMBRANCES

1. Have all surface encumbrances that are located so as to create a hazard to employees been removed or supported, as necessary, to safeguard employees?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
--	-----------------------	-----------------------	-----------------------

UNDERGROUND INSTALLATIONS

1. Have the estimated locations of all underground installation been determined prior to excavation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Have utility companies been contacted and advised of proposed work?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Are underground installations protected, supported or removed while excavations are open?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PROTECTIVE SYSTEMS

1. Excavation slopes comply with Type C Soil Classification?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. If no to question 1, has soil been examined and been determined to be other than Type C soil by a Competent Person?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. If protective measures beyond sloping are required, do they meet OSHA Appendix standards?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Health and Safety Program

Attachment 13-3

**EXCAVATION / TRENCHING
AUTHORIZATION**

	Yes	No	N/A
4. If no to question 3, has the protective system been designed and stamped by a Registered Professional Engineer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

MEANS OF EGRESS FOR TRENCHES DEEPER THAN 4 FEET

1. Are stairways, ladders, or ramps provided every 25 feet?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
---	-----------------------	-----------------------	-----------------------

ACCESS AND EGRESS

1. Are structural ramps that are used solely by personnel as a means of access or egress from excavations designed by a competent person?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Are ramps and runways constructed so structural members are connected to prevent displacement?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Are structural ramps that are used for access and egress of equipment designed by a competent person qualified in structural design and constructed in accordance with the design?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Are structural members used for ramps and runways of uniform thickness?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Are cleats used in connecting runway structural members attached in a manner to prevent tripping?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Are structural ramps used in lieu of steps provided with cleats or other surface treatment to prevent slipping?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

EXPOSURE TO VEHICULAR TRAFFIC

1. Are personnel exposed to public vehicular traffic wearing reflectorized or high visibility vests?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
--	-----------------------	-----------------------	-----------------------

EXPOSURE TO FALLING LOADS

1. Are employees prohibited from standing underneath loads handled by lifting or digging equipment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Are employees prohibited from standing next to vehicles being loaded or unloaded?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

WARNING SYSTEMS FOR MOBILE EQUIPMENT

1. Are warning systems such as barricades, hand or mechanical signals, or stop logs utilized when mobile equipment is operated adjacent to or at the edge of an excavation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
---	-----------------------	-----------------------	-----------------------

TESTING FOR HAZARDOUS ATMOSPHERES

1. Are the atmospheric hazards that can be reasonably expected to exist in excavations greater than 4 feet deep tested and controlled?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	READING:	TIME:	INITIAL:
2. Test of Oxygen Content:	_____ % O ₂ (19.5% Minimum)	_____	_____
3. Test for Flammable Concentrations:	_____ % LEL (10% Maximum)	_____	_____
4. Test for Toxic Concentration:	_____ %PPM of _____	_____	_____



Health and Safety Program

Attachment 13-3

**EXCAVATION / TRENCHING
AUTHORIZATION**

	Yes	No	N/A
5. Is testing conducted as often as necessary to ensure safety personnel?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

EMERGENCY RESCUE EQUIPMENT

1. Is emergency rescue equipment such as SCBA, safety harness and line, or basket stretcher readily available and attended when hazardous atmospheric conditions exist?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Are employees who enter bell-bottom pier holes or other similar deep and confining excavations wearing a body harness with a life-line?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION

1. Are employees prohibited from entering excavations that have accumulated water?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Is water being controlled or prevented from accumulating in excavation by the use of water removal equipment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Is water control equipment operation being monitored by a competent person?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Are diversion ditches, dikes, or other suitable means used to prevent surface water from entering excavation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Are excavations subjected to run-off from heavy rain immediately re-inspected by a competent person?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PROTECTION OF EMPLOYEES FROM LOOSE ROCK OR SOIL

1. Is adequate protection provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Are employees protected from excavated or other material and equipment by placing this material a minimum of two (2) feet from the edge of excavations or by the use of retraining devices?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

STABILITY OF ADJACENT STRUCTURES

1. Are support systems such as shoring, bracing, or underpinning provided to ensure stability of adjoining structures (i.e., buildings, walls) endangered by excavation activities?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Has any excavation below the level of the base or footing of foundations or retaining walls been:			
• Provided with a support system such as under pinning to ensure the safety of employees and stability of the structure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Performed in stable rock?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Determined by a registered professional engineer that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
• Determined by a registered professional that the excavation work will not pose a hazard to employees?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Is the undermining of sidewalks and pavement structures prohibited?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

INSPECTIONS

1. Are daily inspections of excavations where employee exposure can be reasonably anticipated being done by the competent person?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Are inspections being performed by a competent person after every rainstorm or other hazard increasing occurrence?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Are employees removed from the excavation if the competent person finds evidence at any time of a situation that could result in a possible cave-in, protective system failure, hazardous atmosphere or other hazardous condition?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Health and Safety Program

Attachment 13-3

EXCAVATION / TRENCHING AUTHORIZATION

Yes No N/A

FALL PROTECTION

1. Are standard guardrails provided on walkways and bridges that cross over excavations?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Are all remotely located excavations adequately barricaded or covered?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Are temporary wells, pits, shafts and similar exploratory operations backfilled upon completion?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I have inspected the excavation described in this authorization:

Signature of Competent Person

Date



Health and Safety Program

Attachment 13-4

**DAILY EXCAVATION / TRENCH
INSPECTION REPORT**

Competent Person: _____ Date: _____

Project Name: _____ Weather Conditions: _____

Project Location: _____ Rainfall Amounts
24 hours Previous: _____

"I hereby attest that the following conditions existed and that the following items were checked or reviewed during this inspection".

Check Yes, No or N/A for Not Applicable. If comment is required, circle the number and see Page 2.

		Yes	No	N/A
1.	Are barricades or covers in place and in good condition?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	Have any tension cracks observed along top on any slopes?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	Is excavated material at least 2' from the edge of the excavation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	Are slopes cut at design angle of repose?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	Is any water seepage noted in trench walls or bottom?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	Are pumps in place or available if needed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	Is bracing system installed in accordance with design?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	Is there evidence of significant fracture planes in soil or rock?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	Is there any evidence of caving or sloughing of soil since the last inspection?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	Are there any zones of unusually weak soils or materials not anticipated?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.	Are there any noted dramatic dips or bedrock?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.	Are all short-term trench(s) covered within 24 hours?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.	Have non-compliance items been photographed?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.	Are hydraulic shores pumped to design pressure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15.	Is shoring being used secure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.	Does plan include adequate safety factor for equipment being used?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.	Is traffic adequately away from trenching operation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.	Are barricade up and secure?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.	Are there trees, boulders or other hazards in area?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.	Is vibration from equipment or traffic to close to trenching operation?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21.	Are trench box(s) certified?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22.	Are GFCI's used on ALL temporary electrical cords?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23.	Is access and egress located every 25 feet?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24.	Is hazardous testing done on a regular basis?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25.	Has rescue procedure been established and is equipment immediately available?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Health and Safety Program

Attachment 13-4

DAILY EXCAVATION / TRENCH INSPECTION REPORT

Comments: Place question number in front of applicable comment.

APPENDIX B

INJURY/INCIDENT REPORTING

Health and Safety Operating Procedure 101

PURPOSE

This health and safety operating procedure (HSOP) provides guidance in the timely preparation of injury/incident reports. Prompt reporting is critical for effective accident investigation and implementation of prompt corrective action. Timely reporting also helps compliance with regulatory requirements and helps reduce company liability.

SCOPE

This HSOP applies to all URS Greiner Woodward Clyde (URSGWC) employees.

EMPLOYEE CERTIFICATION/TRAINING REQUIREMENTS

All employees will receive a briefing on the requirements of this HSOP.

RESPONSIBILITIES

Any employee who suffers a work-related injury or illness, is involved in an accident, or who observes a reportable incident shall immediately notify his or her supervisor or company health and safety representative. The employee will, if asked by his or her manager or health and safety representative, complete a health and safety injury/incident report (attached).

If the employee is unable to complete the injury/incident report, it may be completed by the *line supervisor, project manager, or health and safety representative.*

DEFINITIONS

Reportable Incident. A reportable health and safety incident is any of the following:

- An injury to any URSGWC worker or subcontractor even if the injury does not require medical attention
- An injury to a member of the public occurring on a URSGWC work site or possibly resulting from a URSGWC or subcontractor activity or involving URSGWC or subcontractor property, equipment, or resource
- Illness resulting from suspected chemical exposure
- Fire, explosion, or flash

- Vehicle accidents occurring on site, while traveling to and from client locations. or with any company-owned or leased vehicle
- Property damage resulting from any URSGWC or subcontractor activity
- Structural collapse or potential structural hazards
- Equipment failure, damage, or improper operation
- Personal protection equipment (PPE) failure, malfunction, damage, or improper use
- Unexpected release or imminent release of a hazardous material
- Unexpected chemical exposures to workers or the public
- Infractions or violations of health and safety rules or plans
- A complaint from the public regarding any URSGWC activity

Major Incident. A major incident is one that involves a fatality, hospitalization of a URSGWC or subcontractor employee, or any illness or injury to a member of the public that is related to any URSGWC activity.

PROCEDURES

Reportable Incidents

The following actions are to be taken within the specified time frame following all reportable incidents (see definition above).

Employees

- If necessary, suspend operations and secure and/or evacuate the area.
- Notify your supervisor, project manager (if applicable), human resources representative, and local health and safety representative within 24 hours of occurrence.
- Record information pertaining to the incident (e.g., time, date, location, name and company of person(s) involved, description of event, and actions taken).

- If directed by management, complete injury/incident report (attached)
- Assist with incident investigation (as directed by management).
- Implement corrective actions as directed by management.
- *Do not* discuss the incident with members of the news media or legal representatives (except URSGWC legal counsel or your personal legal advisor) unless directed to do so by URSGWC management.
- *Do not* make statements pertaining to guilt, fault, or liability.

Line/Project Management

- Review circumstances of the incident with applicable employee(s).
- Verify that representatives of the health and safety and human resources departments have been notified of the incident.
- Verify that an injury/incident report is completed. (Note: If the employee is unable to complete the report, another company employee, line manager, project manager, or local health and safety representative may complete the report.)
- Review and verify that necessary corrective actions are identified and implemented.
- When appropriate, discuss with department or project staff the circumstances surrounding the incident and corrective actions taken.
- If necessary, notify client of incident and corrective actions.

Local Health And Safety Representative

- Assist with incident evaluation.
- With management, identify cause(s) of incident and identify corrective actions needed to avoid recurrence.
- Review injury/incident report for completeness and accuracy.

- Forward a copy of the injury/incident report to the regional health and safety manager and, when appropriate, to a representative of the human resources department.
- Verify that corrective actions are implemented.
- When necessary, notify the Occupational Safety and Health Administration (OSHA) or applicable regulatory agency of the incident (see Major Incidents section, below).

Local Human Resources Representative

- Report work-related injuries and illness to worker compensation carrier.
- Identify injuries and illnesses that are OSHA recordable. (Note: All work-related illnesses are OSHA recordable.)
- Track and record lost time and/or work restriction days.
- Maintain OSHA 200 log.

Major Incidents

A formal investigation will be conducted for all major incidents. In addition to the procedures identified above, the following actions shall be taken for major accidents.

Employees

- Stop work; secure and/or evacuate the area.
- Without placing yourself in danger, assist injured personnel and/or implement spill control procedures.
- If necessary, summon emergency assistance.
- *Immediately notify* management and the local health and safety representative.

Line/Project Management

- Verify that local health and safety representative has been notified.
- Notify client or client's representative.
- Assist with formal incident investigation.

Operations Manager

- Notify upper management and corporate legal counsel.
- If necessary, serve as company spokesperson.
- Participate in formal incident investigation.
- Verify that corrective actions are implemented.

Local Health And Safety Representative

- Record pertinent data as they becomes available.
- Notify regional health and safety manager.
- If necessary, notify OSHA or applicable regulatory agency. (Note: OSHA, or the applicable state authority, *must be notified* within 8 hours of all work-related fatalities or accidents resulting in the hospitalization of three or more workers.)
- When requested, assist with formal incident investigation.

Regional Health And Safety Manager

- Notify corporate health and safety director.
- Verify that upper management and corporate legal counsel have been informed of the incident.
- Verify that OSHA or applicable regulatory agency has been notified.
- Serve as lead for the incident investigation team.
- Submit incident investigation report to upper management.

Human Resources Department

- If necessary, notify immediate family of incident.
- If necessary, coordinate benefits with insurance carrier.

INJURY/INCIDENT REPORT

ADMINISTRATION INFORMATION:

Project Name: _____
 Project Number: _____
 Date/Time of Incident: _____
 Location: _____

For Injuries/Illnesses:

Name of Injured Employee: _____
 Age: _____ Sex: _____ SSN: _____
 Nature of Injury: _____
 See a Doctor? Yes No

TYPE OF INCIDENT (Check all applicable items)

Illness	Fire, Explosion, Flash	Injury
Unexpected Exposure	Property Damage	Vehicular Accident
Health and Safety Infraction	Other (describe) _____	

DESCRIPTION OF INCIDENT (Describe what happened and possible cause. Identify individuals involved, witnesses, and their affiliations. Attach additional sheets, drawings, or photographs as needed.)

Description of Corrective Action: _____

REPORTED BY: Print Name: _____ Signature: _____

Date: _____

Reporter must deliver this report to the operating unit health and safety representative within 24 hours of the reported incident for medical treatment cases and within 5 days for other incidents.

REVIEWED BY:

Supervisor _____ Date _____

Health and Safety Representative _____ Date _____

Distribution by HSO:

- Regional Health and Safety Manager
 - Corporate Health and Safety Director
 - Project Manager
 - Human Resources Office (injury/illness cases only)
- OSHA Recordable?
Yes No

APPENDIX C

106.1 PURPOSE

Woodward-Clyde uses subcontractors extensively for drilling, excavation, and other site tasks. The health and safety liability potential for both Woodward-Clyde and its clients requires selection of qualified contractors with a strong health and safety program and safety experience record. The goal of this Operating Procedure (OP) is to reduce the risk of site injury/occupational illness and potential liability by proper subcontractor selection and on-site interaction.

This OP is not applicable to non-site work such as laboratory subcontractors.

106.2 SUBCONTRACTOR SELECTION

Woodward-Clyde project managers shall use health and safety qualifications as a key component in selecting qualified subcontractors. Form HS-106 shall be provided to the contractor for information and returned to Woodward-Clyde for review. Expected criteria include:

- The Worker's Compensation Experience Modification Rate (EMR) shall be less than 1.0
- The contractor shall have a written safety program which includes responsibility/authority, hazard communication, and other procedures appropriate to the type of work.
- The subcontractor shall have no more than one OSHA/State OSHA citation in the past three years.
- If hazardous materials work, the contractor employees must be current in medical surveillance and training, and shall provide the appropriate documentation.
- The contractor shall meet the Woodward-Clyde insurance liability requirements, and provide the required insurance documents.

106.3 CLIENT-SPECIFIC REQUIREMENTS

Client clients may have additional requirements including drug testing, process safety training, and site specific orientation. Woodward-Clyde project staff will assure that our subcontractors meet the client specific requirements.

106.4 RESPONSIBILITY FOR ON-SITE SAFETY

The subcontractor firm shall maintain primary responsibility for their employee health and safety and for compliance with applicable regulations. OSHA regulations and liability law generally hold the contractor, such as Woodward-Clyde, responsible for the health and safety of subcontractors. Despite the assignment of health and safety responsibility to the subcontractor in the written contract, Woodward-Clyde must monitor subcontractor compliance and take appropriate actions if work is performed in an unsafe manner or in violation of regulatory requirements.

For sites with a Woodward-Clyde Health and Safety Plan (HSP), the subcontractor must comply with the HSP provisions and the direction of the Site Safety Officer (SSO).

106.5 ON-SITE SAFETY MEETINGS

On-site safety meetings between Woodward-Clyde and subcontractors will be conducted at the beginning of field work and at least weekly during the course of field projects. The initial meeting shall emphasize the subcontractor responsibilities, the importance of performing the work safely, the results of non-compliance, and the key site hazards. Follow-up meetings shall include review of any incidents, recognition of good safety performance, and continued emphasis on control of hazards.

106.6 SUBCONTRACTOR NOTIFICATION

Woodward-Clyde employees observing unsafe acts, unsafe conditions, or HSP violations shall promptly notify the subcontractor supervisor and request corrective action. Failure of the subcontractor to correct the problem will result in work being stopped if the hazard is imminent or contact of the Woodward-Clyde project manager if the hazard is not imminent. Repeated failure of the subcontractor to correct unsafe acts or conditions will result in removal from the site. Individual subcontractor employees that do not comply with the HSP or other safety requirements may be removed from the site by the Woodward-Clyde site supervisor.

**CONTINGENCY
PLAN**

**DETREX CORPORATION
ASHTABULA, OHIO**

**Project No. 38-08E06011
June 21, 2000**

1.1	INTRODUCTION	3
1.2	EMERGENCY RECOGNITION AND PREVENTION	3
1.2.1	Fires	3
1.2.2	Chemical Exposures.....	3
1.2.3	Physical Injury	4
1.3	EMERGENCY ALERTING PROCEDURES	4
1.4	SITE SECURITY, SITE CONTROL, AND SITE EVACUATION PROCEDURES	4
1.5	EMERGENCY TELEPHONE NUMBERS	5
1.6	EMERGENCY RESPONSE PROCEDURES	6
1.6.1	Emergency Response Personnel	6
1.6.2	Emergency Response Equipment.....	7
1.7	EMERGENCY DECONTAMINATION PROCEDURES	7
1.8	ON-SITE MEDICAL TREATMENT AND EMERGENCY FIRST AID PROCEDURES	7
1.9	EVACUATION ROUTE	8
1.10	DIRECTIONS TO HOSPITAL FROM SITE.....	8

1.1 INTRODUCTION

The purpose of this section of the HASP is to address how personnel will respond to emergencies. The types of potential emergencies that are addressed by this plan include:

- Fire;
- Chemical exposures to personnel; and
- Physical injuries to personnel.

After any emergency, the URSGWC SSO shall document in a detailed emergency summary report including the nature of the emergency, causes for occurrence, chemical exposures or physical injuries to personnel, physical damage, and emergency responses taken. This report shall be in addition to the Health and Safety Incident Report. Copies of this report must be submitted to the URSGWC PM, the URSGWC Field Supervisor, the URSGWC HSM, the URSGWC RHSM, and BP representatives within 24 hours of the emergency. The URSGWC RHSM will review this report as soon as possible and issue a critique of the response to the emergency within 48 hours of receiving the report. This critique will be distributed to all personnel receiving copies of the emergency summary report. If this critique indicates that additional emergency response equipment, training, personnel, or response procedures are required at the site, these actions will be implemented as soon as possible.

1.2 EMERGENCY RECOGNITION AND PREVENTION

1.2.1 Fires

Fires are possible whenever flammable gases or vapors are present in proper concentrations and an ignition source is present. The drilling and excavating equipment itself provides an ignition source. To prevent fires, a CGI, will be used at the discretion of the URSGWC SSO to detect flammable concentrations of gases or vapors. Ignition sources (including drilling and excavating equipment) will be turned off, and the area will be evacuated if vapors or gases reach 10 percent of the LEL. Work will not resume until the URSGWC SSO observes CGI flammable gas concentrations continuously below 10 percent of the LEL for 15 minutes or more.

1.2.2 Chemical Exposures

Work will be performed in such a manner that exposure to contaminants through skin or eye contact, inhalation, or ingestion is minimized. Work practices that will be followed to reduce chemical exposures include:

- PPE, for the appropriate work activities and areas as defined by the URSGWC SSO, will be used by all field personnel. A formal revision to the HASP must be made by the URSGWC HSM and approved by the RHSM in order to modify the PPE requirements.
- Keep hands away from face during work activities.
- Minimize all skin and eye contact with contaminants.

Early recognition of chemical exposure symptoms is essential to the prevention of serious chemical exposure incidents. Symptoms of exposure to the type of compounds potentially present at the site include the following: fatigue; weakness; eye, nose, and skin irritation; headache; nausea; vomiting; malaise; tremors; anemia; and muscle spasms.

If a person experiences any of these symptoms, or others, or recognizes any of the symptoms in a fellow worker, the person experiencing the symptoms will stop work and report his or her symptoms to the URSGWC SSO. The SSO will notify the HSM and Greaney Medical Group (URSGWC's medical surveillance provider and consultant). If the symptoms persist or appear to be damaging in any way, the URSGWC SSO will make arrangements to take the individual to a hospital for medical treatment. If symptoms are serious, work activities in the area where the person was exposed will be discontinued until more is known about the incident. Incident reporting procedures will be initiated.

1.2.3 Physical Injury

Personnel should constantly look for potential safety hazards such as holes or ditches; precariously positioned objects, such as drums or equipment that may fall; sharp objects, such as nails, metal shards, and broken glass; protruding objects at eye or head level; slippery surfaces; steep grades; uneven terrain or unstable surfaces, such as walls that may cave in or flooring that may give way. Personnel will inform the URSGWC SSO of any potential hazards identified so that corrective mitigative action can be taken.

1.3 EMERGENCY ALERTING PROCEDURES

The URSGWC SSO will use a portable radio or direct contact to alert the appropriate work groups when and if an emergency occurs.

1.4 SITE SECURITY, SITE CONTROL, AND SITE EVACUATION PROCEDURES

In emergency situations, the following actions will be enforced:

- All equipment and operations will cease. The only exception will be related to health and safety. The SSO must determine at the time of an emergency if health and safety will be jeopardized by immediate stoppage of any particular piece of equipment or personnel

activities. If such a determination is made, personnel involved in critical duties must be minimized and special instructions established.

- All personnel will meet at a location upwind from the emergency. This area will be designated daily by the URSGWC SSO at the Site Safety Briefing.
- Security and control of the project area will be the responsibility of URSGWC. The URSGWC SSO will coordinate the emergency situation with appropriate personnel and emergency responders (e.g., fire department, ambulance squad, haz-mat responders, etc.).
- Site security personnel will not permit any additional personnel (with the exception of emergency response personnel) from entering the site.
- If an emergency occurs in the Exclusion Zone, personnel in the Exclusion Zone will proceed immediately to the Contamination Reduction Zone to decontaminate, then proceed to an upwind location. If this is not possible, personnel will leave the area of the emergency as soon as possible by the nearest point of egress from the Exclusion Zone, remove contaminated protective clothing, contain this protective clothing as well as possible to mitigate spread of contaminants, and proceed to an upwind location.
- The URSGWC SSO will communicate with subcontractor supervisors during emergencies. Supervisors will then relay information to their employees. Portable radios, if available, or audio and/or visual signals will be used to communicate the nature of the emergency and response actions.

1.5 EMERGENCY TELEPHONE NUMBERS

Emergency telephone numbers are given below:

EMERGENCY SERVICES

Agency	Telephone No.
Ambulance	911
Fire Department	911
Police Department	911
Ashtabula County Medical Center	440-997-6600
2420 Lake Avenue Ashtabula, Ohio 44004	
URS Greiner Woodward Clyde Health & Safety Manager	
Solon – Ken Armstrong	(216) 241-7312
Corporate - Phil Jones	(215) 542-3800

Environmental Protection Agency

Ohio Emergency	(800) 282-9378
Ohio EPA	(614) 466-8500
Federal (Region V)	(312) 353-2072
USEPA Environmental Response Team	(201) 321-6660

Chem-Tel (24-HOUR EMERGENCY SPILL RESPONSE INFO)(800) 255-3924

(for a spill of DNAPL, use Code Word "DET DNAPL")

These emergency phone numbers will be verified by the URSGWC Field Supervisor and SSOs prior to initiation of field work.

1.6 EMERGENCY RESPONSE PROCEDURES

The following subsection discusses the personnel and equipment that will be available in the event of an emergency.

1.6.1 Emergency Response Personnel

The URSGWC SSO will have the primary role in responding to all emergencies in the project area. All personnel working in the project area will contact the SSO in case of emergency. The SSO must be present in the project area during all work activities. If reasonable contact cannot be maintained, the URSGWC SSO will carry a two-way portable radio and each isolated activity group will also have a two-way portable radio. If any emergency such as a fire, chemical exposure, or physical injury occurs, the SSO will be immediately contacted. The SSO will be trained in CPR/First Aid. In cases of emergency response, all field personnel will take direction from the SSO. If the SSO is not present, URSGWC Field Supervisor will respond to emergencies. At any given time, there will be at least one URSGWC employee on site with CPR/First Aid training.

1.6.2 Emergency Response Equipment

The following emergency response equipment is maintained by the URSGWC SSO:

- First Aid Kit (including bloodborne pathogen exposure control kit)
- First Aid Directions

The supplying of these emergency response equipment at the site does not reduce the need to contact appropriate off-site emergency response agencies during emergencies at the site.

1.7 EMERGENCY DECONTAMINATION PROCEDURES

Decontamination of an injured or exposed worker will be performed only if decontamination does not interfere with essential treatment.

- If decontamination can be done: wash, rinse, and/or cut off protective clothing and equipment.
- If decontamination cannot be done:
 - ⇒ Wrap the victim in blankets or plastic sheeting to reduce contamination of other personnel;
 - ⇒ Alert emergency and medical personnel to potential contamination; and,
 - ⇒ Arrange to have SSO or other personnel familiar with the incident and contaminants at the site accompany the victim to the hospital.

1.8 ON-SITE MEDICAL TREATMENT AND EMERGENCY FIRST AID PROCEDURES

Medical treatment and first aid may be administered by the SSO or other personnel who have been trained in First Aid. General first aid procedures include:

- Remove the injured or exposed person(s) from immediate danger. Support head, neck, and back whenever a victim of trauma, including falls, must be moved.
- Render first aid, if necessary, and decontaminate affected personnel, if necessary.
- Call an ambulance for transport to local hospital immediately. This procedure should be followed even if there is no apparent serious injury. Emergency telephone numbers are listed in Section 1.4.
- Evacuate other personnel to a safe place until the SSO (assisted by the URSGWC Field Supervisor) determines that it is safe for work to resume.
- Report the accident to the URSGWC HSM and URSGWC PM immediately.

1.9 EVACUATION ROUTE

A car should be parked near locations where excavations, drilling or sampling is occurring; it should face the closest exit.

Upon arrival at the site, the SSO will determine all possible evacuation routes and review those with field personnel during the first on-site briefing and periodically thereafter. The SSO will also drive the hospital route prior to commencement of site work.

1.10 DIRECTIONS TO HOSPITAL FROM SITE

Exiting the site to State Road, turn left (south) travel approximately 0.75 mile turn right (west) at the first road which is east 21st Street. You will cross State Route 11 continue on to the stop sign. At the stop sign turn left (south) onto Columbus Avenue for approximately 0.25 miles turn right (west) at the flashing light onto east 23rd. Travel on east 23rd to the stop sign at Harbor avenue. Turn left (south) on Harbor and then an immediate right onto east 24th street. The hospital is on the south east corner of east 24th street and Lake Avenue.

The directions to the hospital must be verified by the URSGWC Field Supervisor and SSOs prior to initiation of fieldwork.